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OBSERVATIONS

ON THE

NATURE and CONSEQUENCES

OF THOSE

INJURIES to which the HEAD is liable from
External Violence.

By PERCIVALL POTT, F.R.S.

AND

SURGEON to ST. BARTHOLOMEW'S-HOSPITAL.

Nullum capitis vulnus contemnendum.

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TO
JOHN DARKER, Esq;
TREASURER
OF
St. BARTHOLOMEW'S-HOSPITAL.

S I R,

THE polite and friendly treatment which the officers of St. Bartholomew's have always received from you, is very gratefully acknowledged by them all.

DEDICATION.

Give me leave as one of them,
to return you my particular thanks,
to beg leave to address the following
sheets to you, and to subscribe my-
self,

S I R,

Your obliged, and

Obedient humble Servant,

Percivall Pott.

OBSERVATIONS

ON THE

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INJURIES to which the HEAD is liable from
external Violence.

S E C T. I.

Wounds of the scalp.

PREVIOUS to an account of such wounds and injuries of the head, as interest the skull, the brain, and its membranes; it may not be amiss to take some small notice of those to which the scalp is liable. For this, though it be called the common tegument of the head, yet from the variety of parts of which it is composed, from their structure, connexions, and uses, in-

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juries done to it, by external violence, become of much more consequence, than the same kind of ills can prove, when inflicted on the common teguments of the rest of the body.

The covering, called the scalp, consists of the cutis; the membrana adiposa, or cellularis; the expanded tendons of the frontal, occipital, and temporal muscles, (forming a kind of aponeurosis;) and the membrane which immediately covers the bones of the skull, called therefore the pericranium.

This variety of parts, upon the infliction of wounds, blow, &c. frequently occasions a variety of symptoms; which symptoms ought by practitioners to be carefully and properly distinguished from each other; not only because they often arise from the distinct, and particular nature, of the part injured; but because they generally point out the most effectual means of relief. If to these considerations we add another, no less true, and important, (viz.) that there is, and must be a constant communication, by means of blood-vessels, between all the parts without and within the head, it will appear, that injuries done to this part, tho' seemingly, and at first sight, slight and trivial,

vial,

vial, may sometimes prove of the greatest consequence.

I will not waste the reader's time, by entering into a detail of the method of treating common incised wounds ; but proceed immediately to those which, (tho' the mischief is originally confined to the mere scalp,) yet are frequently very terrible to behold ; are often attended with alarming symptoms, and sometimes with danger. These are what are called lacerated wounds ; and those made by puncture. The former may be reduced to two kinds, (viz.) those in which the scalp, tho' torn, or unequally divided, still keeps its natural situation, and is not stript or separated from the cranium, to any considerable distance, beyond the breadth of the wound : and those, in which it is considerably detached, from the parts it ought to cover.

The first of these, if simple, and not combined with the symptoms, or appearances of any other mischief, do not require any particular, or different treatment, from what the same kind of wounds require in all other parts : but the latter, (those in which the scalp is separated, and detached from the parts it ought to cover,) are not

only, by the different methods in which they may be treated, frequently capable of being cured, with a considerable deal, more, or less, ease, and expedition ; but are also sometimes a matter of great consequence to the health and well-being of the patient. Both writers and practitioners differ much, in their advice, and conduct on this subject. With some it is a practice, immediately to remove such portion of the scalp as is fairly and perfectly detached from the parts underneath ; with others, to attempt its preservation.

Each of these opinions can be considered in a general sense only ; not as applicable to every individual case without distinction : and taken in such general consideration, they cannot be both right. It may therefore be worth while to enquire, what reasons each party has to give for its opinion and conduct.

They who advise the removal, affirm, that when a large portion of the scalp has been perfectly and totally separated from the parts it ought to cover, and that for some considerable space, it will not again coalesce or unite with such parts ; and therefore that an attempt to procure such
union,

union, by replacing the separated piece, will only protract the time of cure, by furnishing a lodgment for matter, and floughs; which matter and floughs must prevent the thing intended. That in case of large wounds, or of those produced by great force, as we cannot by any means be certain, that no mischief is done to the parts under the cranium, the replacing the lacerated scalp, may not only prevent our immediate enquiry into the nature of such mischief, but may conceal, and hide (at least for a time) such future appearances as might furnish indications for a surgeon's conduct.

They who advise the preservation of the separated * scalp, do it upon a supposition, that it will in general unite again; that if it does, the patient may thereby be spared a great deal of pain; save much time, and sustain much less deformity: that with regard to the immediate enquiry into the state of the cranium, it may be made before the scalp is replaced: that if there be
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* I presume I need not observe, that when I say *separated*, I mean only with regard to the inferior surface of such piece, and that it is still contiguous with some part of the skin.

no present symptoms which indicate injury done to the parts underneath, it would be absurd to act merely upon the presumption, that there may be some in future: that it will be more proper and vindicable, to do what is right at first; or according to the present circumstance, and to attend to what *may* happen or occur hereafter, when such occurrences have happened: and that the formation of matter, and sloughs, under the detached and replaced portion, will not, in general, under proper management, prevent its reunion.

It is to be presumed, that every practitioner wishes to cure his patients as soon as he can; by the least painful means, and in such manner as shall be productive of the least possible deformity or defect; taking care at the same time, not to be inattentive to any evil, which may arise; nor to omit, or neglect doing whatever may be necessary during such cure.

Upon this principle, I make no scruple of declaring it as my opinion, that the preservation of the scalp ought always to be attempted, unless it be so torn as to be absolutely spoiled, or there are manifest present symptoms of other mischief. This kind of
wound

wound is sometimes very terrible to look at ; and they who have not been accustomed to see it, may be inclined to think there is no remedy but excision ; but I have so often made the experiment of endeavouring to preserve the torn piece, and have so often succeeded, that I would recommend it as a thing always to be attempted, even tho' a part of the cranium should be perfectly bare, unless the two circumstances already mentioned render it improper or impracticable. The removal of it necessarily produces a larger sore, which must require a good deal of time to heal, and must leave a considerable deformity ; the preservation of it prevents both.

Therefore when such case occurs, let the surgeon be particularly careful to examine, whether there are any appearances, or symptoms, of any other kind of mischief beside what the scalp has sustained ; and if there be neither, let him make the torn piece clean from all dirt, or foreign bodies ; and restore it quickly, and as perfectly as he can, to its natural situation.

The manner in which it is to be there maintained, must a good deal depend upon the particular circumstances of each indivi-

dual case, and therefore must be left to the surgeon, who will make use of plaster, bandage, and future, together or separately, as he shall find them most convenient, and best fitted to the purpose.

I am aware that the very mention of a future in a wound of the scalp, particularly a lacerated one, will startle some of my readers, who have been taught that it is always wrong in both: I know that this is the general doctrine; but I know also, that although it be sometimes true, yet if it be implicitly adhered to, it will prevent a practitioner now and then from receiving a very useful assistance. A stitch, made with a slip-knot, will sometimes, hold the divided parts in such situation, as will greatly expedite a cure: in many cases a very short time will answer the end, and the thread may be removed as soon as ever the purpose is accomplished, or the future becomes either improper or useless.

In some cases, this will be all that is required; the loosened scalp will unite with the parts from which it was torn and separated, and there will be no other sore, than what arises from the impracticability of bringing the lips of the wound into smooth

smooth and immediate contact; the scar of which fore must be small in proportion.

On the other hand, it sometimes happens that such perfect re-union is not to be obtained; in which case matter will be formed and collected in those places, where the parts do not coalesce; but this does not necessarily make any difference, either in the general intention, or in the event; this matter may easily be discharged, by one or two small openings made with a lancet; the head will still preserve its natural covering; and the cure will be very little retarded by a few small abscesses.

I must desire not to be misunderstood: I do not mean to say, that it must be always, and invariably right, to return the loosened scalp, and to endeavour to procure its immediate re-union; or that such attempt will always succeed: I only mean to signify, that it is my opinion, (and that founded on experience) that the mere separation or detachment of the scalp, to however large an extent, is not a good, and sufficient reason, for cutting off any part of it in cases where no other mischief seems to have been done, in which the cranium is uninjured, and the parts within it unhurt; and, that the attempt

tempt to procure a re-union with the parts from which it was separated, tho' it will sometimes fail, yet will most frequently succeed ; and is always worth making ; as such experiment properly made, can never be attended with any real inconveniences.

In some cases, the whole separated piece, will (as I have said before) unite perfectly, and give little or no trouble ; especially in young, and healthy persons ; in some, the union will take place in some parts, and not in others ; and consequently matter will be formed, and require to be discharged, perhaps at several different points ; and in some particular cases, circumstances, and habits, there will be no union at all : the torn cellular membrane, or the naked aponeurosis, will inflame, and become floughy ; a considerable quantity of matter will be collected, and perhaps the cranium will be denuded : but even in this state of things, which does not very often happen, where proper care has been taken, and is almost the worst which can happen in the case of mere, simple laceration, and detachment, I say, even in this, if the surgeon will not be too soon, nor too much alarmed, nor in a hurry to cut, he will of-

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ten find the cure much more feasible than he may at first imagine : let him take care to keep the inflammation under by proper means ; let him have patience till the matter is fairly and fully formed, and the sloughs perfectly separated ; and when this is accomplished, let him make a proper number of dependant openings for the discharge of them ; and let him by bandage, and other proper management, keep the parts in constant contact with each other ; and he will often find, that although he was foiled in his first intention of procuring immediate union, yet he will frequently succeed in this his second ; he will still save the scalp, shorten the cure, and prevent the great deformity arising, (particularly to women) not only from the scar, but from the total loss of hair.

I have said, that this union may often be procured, even tho' the cranium should have been perfectly denuded by the accident ; and it is true ; not only tho' it should have been stript of its pericranium at first ; but even if that pericranium should have become sloughy and cast off, as I have often seen.

Exfoliation from a cranium laid bare by external violence, and to which no other injury has been done than merely stripping it of its covering, is a circumstance which would not so often happen, if it was not taken for granted, and the bone treated according to such expectation; the soft open texture of the bones of children and young people, will frequently furnish an incarnation, which will cover their surface, and render exfoliation quite unnecessary; and even in those of mature age, and in whom the bones are still harder, exfoliation, is full as often the effect of art, as the intention of nature, and produced by a method of dressing, calculated to accomplish such end, under a supposition of its being necessary. Sometimes indeed it happens, that a small scale will necessarily separate, and the sore cannot be perfectly healed till such separation has been made; but this kind of exfoliation will be very small, and thin in proportion to that produced by art; that is, that produced by dressing the surface of the bare bone with spirituous tinctures, &c: and when a wound on the head, with a sound uninjured bone, denuded by the accident, shews a disposition to heal without exfoliation; it

never

never can be right to counteract nature, and oblige her to do that she is not inclined to, and which she would accomplish her purpose better without doing.

If the scalp be detached by such means, or with such force of instrument, that the skull, or parts within it have suffered, then the immediate union of the skin becomes impracticable, and it would be highly injudicious to attempt it; our attention then must be paid to the greater evil; it then becomes another kind of case, and all that need be said of it in this place, is, that although such mischief does generally require the removal of some part, yet even in this situation, no more of it should be cut off than what will be necessary for the detection and proper treatment of such mischief. In short, whether considered as skin, or as the seat of the hair, it ought never to be removed wantonly, or without absolute necessity.

Small wounds, that is, such as are made by instruments, or bodies, which pierce, or puncture, rather than cut, are in general more apt to become inflamed, and to give trouble, than those which are larger; and in this part particularly, are sometimes attended

tended with so high inflammation, and with such symptoms, as alarm both patient and surgeon.

The parts capable of being hurt by such kind of wound, are the skin, the tela cellulosa, the expanded tendons of the muscles of the scalp, and the pericranium.

If the wound affects the cellular membrane only, and has not reached the aponeurosis or pericranium, the inflammation, and tumour, affect the whole head, and face; the skin of which wears a yellowish cast, and is sometimes thick set with small blisters, containing the same coloured serum; it receives the impression of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour; it is not very painful to the touch; and the eye-lids and ears are always comprehended in the tumefaction, the former of which are sometimes so distended, as to be closed; a feverish heat, and thirst, generally accompany it; the patient is restless, has a quick pulse, and most commonly a nausea, and inclination to vomit.

This accident generally happens to persons of bilious habit, and is indeed an inflammation of the erysipelatous kind; it is somewhat
 alarming

alarming to look at, but is not often attended with danger. The wound does indeed neither look well, nor yield a kindly discharge, while the fever continues, but still it has nothing threatening in its appearance; none of that look which bespeaks internal mischief; the scalp continues to adhere firmly to the skull; and the patient does not complain of that tensive pain, nor is afflicted with that fatiguing restlessness which generally attends mischief underneath the cranium.

Phlebotomy, lenient purges, and the use of the common febrifuge medicines, particularly those of the neutral kind, generally remove it in a short time. When the inflammation is gone off, it leaves on the skin a yellowish tint, and a dry scurf, which continue until perspiration carries them away; and upon the disappearance of the disease, the wound immediately recovers a healthy aspect, and soon heals without any farther trouble.

Wounds and contusions of the head, which affect the brain and its membranes, are also subject to an erysipelatous kind of swelling and inflammation; but it is very different, both in its character and consequences from the preceding.

In this (which is one of the effects of inflammation of the meninges) the febrile symptoms are much higher; the pulse harder and more frequent; the anxiety and restlessness, extremely fatiguing, the pain in the head intense; and as this kind of appearance is, in these circumstances, most frequently the immediate precursor of matter forming between the skull and dura mater, it is generally attended with irregular shiverings, which are not followed by a critical sweat, nor afford any relief to the patient. To which it may be added, that in the former case the erysipelas generally appears within the first three or four days; whereas in the latter, it seldom comes on till several days after the accident; when the symptomatic fever is got to some height. In the simple erysipelas, although the wound be crude, and undigested, yet it has no other mark of mischief; the pericranium adheres firmly to the skull, and upon the cessation of the fever, all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a spongy, glassy, unhealthy aspect, but the pericranium in its neighbourhood, separates

parates spontaneously from the bone, and quits all cohesion with it. In short, one is an accident, proceeding from a bilious habit, and not indicating any mischief beyond itself; the other is a symptom, or a part, of a disease, which is occasioned by injury done to the membranes of the brain; one portends little or no ill to the patient, and almost always ends well; the other implies great hazard, and most commonly ends fatally. It is therefore hardly necessary to say, that it behoves every practitioner to be careful, in distinguishing them from each other.

If the wound be a small one, and has passed thro' the tela cellulosa, to the aponeurosis, and pericranium, it is sometimes attended with very disagreeable, and even very alarming symptoms; but which, arise from a different cause, and are very distinguishable from what has been yet mentioned.

In this the inflamed scalp does not rise into that degree of tumefaction, as in the erysipelas; neither does it pit, or retain the impression of the fingers of an examiner; it is of a deep red colour, unmixed with the
C
yellow

yellow tint of the erysipelas ; it appears tense, and is extremely painful to the touch ; as it is not an affection of the tela cellulosa, and as the ears and the eye-lids are not covered by the parts in which the wound is inflicted, they are seldom, if ever, comprehended in the tumor, though they may partake of the general inflammation of the skin : it is generally attended with acute pain in the head, and such a degree of fever as prevents sleep, and sometimes brings on a delirium.

A patient in these circumstances, will admit more free evacuations by phlebotomy, than one labouring under an erysipelas : the use of warm fomentation is required in both, in order to keep the skin clean and perspirable ; but an emollient cataplasm, which is generally forbid in the former, may in this latter case be used to great advantage.

When the symptoms are not very pressing, nor the habit very inflammable, this method will prove sufficient ; but it sometimes happens, that the scalp is so tense, the pain so great, and the symptomatic fever so high, that by waiting for the slow effect of such means, the patient runs a
risque

risque from the continuance of the fever ; or else the injured aponeurosis, and pericranium becoming sloughy, produce an abscess, and render the case both tedious and troublesome. A division of the wounded part, by a simple incision down to the bone, about half an inch or an inch in length, will most commonly remove all the bad symptoms ; and, if it be done in time, will render every thing else unnecessary.

The injuries to which the scalp is liable from contusion, or the appearances produced in it by such general cause, may for method-sake be divided into two classes, viz. those in which the mischief is confined merely to the scalp ; and those in which other parts are interested.

The former, which only comes under our present consideration, is not indeed of importance, considered abstractedly. The tumour attending it is either very easily dissipated, or the extravasated blood causing it, is easily got rid of by a small opening. I should not therefore have thought it of such consequence, as to be worth mentioning in this place, had it not been for an ac-

cidental circumstance, which sometimes attends it, and renders it liable to be very much mistaken.

When the scalp receives a very smart blow, it often happens that a quantity of extravasated blood immediately forms a tumor, easily distinguishable from all others, and generally very easily cured. But it also sometimes happens, that this kind of tumor produces, to the fingers of an unadvised or inattentive examiner, a sensation, so like to that of a fracture, with depression of the cranium, as may be easily mistaken. Now, if, upon such supposition, a surgeon immediately removes the tumid scalp, he may give his patient a great deal of unnecessary pain, and for that reason run some risque of his own character.

The touch is, in this case, so liable to deception, that recourse should always be had to other circumstances and symptoms, before an opinion be given.

If a person, with such tumor occasioned by a blow, and attended with such appearances, and feel, has any complaint, which seems to be the effect of pressure made on the brain and nerves; or of any mischief done to the parts within the cranium; the
division,

division, or removal of the scalp in order to inquire into the state of the skull, is right and necessary : but if there are no such general symptoms, and the patient is in every respect perfectly well, the mere feel of something like a fracture, will not authorize, or vindicate such operation, since it will often be found, that such sensation is a deception ; and that when the extravasated fluid is removed, or dissipated, the cranium is perfectly sound and uninjured.

The second kind of tumor attending the contused scalp, viz. that which arises from injury done to the cranium, and parts within, does so absolutely proceed from, and depend upon such injury, as not to fall under our consideration in this place at all, but will be considered at large when we come to speak of the mischiefs done to the skull and brain by collision, or contusion.

From what has been said it appears, that the scalp, taken in a general sense, is when wounded or bruised, liable to be affected with four kinds of tumor ; each of which has a distinct cause, and requires, or permits, a different method of treatment.

The first does not imply any injury done to the parts within the skull; requires no operation; and almost always is cured by general remedies.

The second, or that which is caused by the spontaneous separation of the pericranium from the skull, in consequence of internal mischief, is not at first attended with very pressing symptoms; but whoever has observed their progress, and attended to their event, must know what fatal, and frequently irresistible evil, it is the forerunner of: nothing less than the inflammation, and putrefaction of the membranes of the brain, and the formation of matter between them and the skull; and that it is a case which, of all others, will least admit delay.

The third, though it sometimes gives way to free evacuation, and lenient external applications, yet is sometimes also attended with symptoms, which are too pressing to wait the effect of such remedies, and is capable of being immediately relieved by a division of the inflamed and irritated parts; whereas the same incision, made into the first kind of tumefaction, would

would most probably exasperate the disease, and heighten the symptoms.

The fourth, consisting of extravasated blood, seldom requires any chirurgic operation; time, and the use of the common discutient applications*, almost always dissipate it; and it only becomes of consequence, by the possibility of its being misunderstood and mistreated.

* Among which I know of none equal to a solution of crude sal ammon. in vinegar and water, or spt. vin.

S E C T. II.

Effects of contusion, on the dura mater, and parts within the skull.

IN order to understand rightly, and have a clear idea of this kind of injury, it is necessary to recollect, that the vessels of the pericranium, those of the diploe, or medullary substance between the two tables of some parts of the cranium, and those of the dura mater within it, do all, constantly, and freely communicate with each other; and that this communication is carried on, by means of innumerable foramina, found, in all parts, of both surfaces of the skull, as well as at the sutures; that upon the freedom of this communication, depends, the healthy, and sound, state of all the parts concerned in it; and, that from the interruption, or destruction, of this, proceed most of the symptoms attending violent contusions of the head, extravasations of fluid, between the cranium and dura mater, inflammations of the said membrane,

brane, and simple undepressed fracture of the skull.

The pericranium is so firmly attached to the outer surface of the skull, as not to be separable from it without considerable violence; and when such violent separation is made, in a living subject (especially if young) the cranium is always seen to bleed freely, from an infinite number of small foramina. The dura mater, which is a firm strong membrane, is almost as intimately attached to the inside of the skull, as the pericranium is to the outside, and by the same means, viz. by vessels; and by these means a constant circulation, and communication are preserved, and maintained, between the two membranes; and the bones dividing them. This, all the appearances, which attend the scalp-
ing a living person, or the separation of the skull from the dura mater of a dead one, (especially if such person died apoplectic, or was hanged) prove beyond all doubt: in the former, the blood, will, (as I have already observed) be seen issuing from every point of the surface of the cranium; in the latter, not only a considerable degree of force will be found necessary to detach the sawed bone from the subjacent membrane,
but,

but, when it is removed, a great number of bloody points will be seen all over the surface of the latter; which points, if wiped clean, do immediately become bloody again; being only the extremities of broken vessels. These vessels are largest at, and about the sutures; at which places the adhesion is the strongest, and the hæmorrhage upon separation the greatest.

It has been thought by many, that the dura mater was attached to the skull, only at the sutures; that in all other parts it was loose, and unconnected with it; and, that it constantly enjoyed or performed an oscillatory kind of motion; or was alternately elevated and depressed. This idea, and opinion, were borrowed from the appearance which the dura mater makes in a living subject, after a portion of the skull has been removed: but although it has been inculcated by writers of great eminence, yet it has no foundation in truth or nature; and has misled many practitioners, in their opinions, not only of the structure and disposition of this membrane, but in their ideas of its diseases.

The dura mater does on the internal surface of the bones of the cranium, the office

fice of periosteum, in the same manner as the pericranium does on the external; (at least they have no other :) to this it is so firmly, and so generally attached, as to be incapable of any, even the smallest degree of motion. The alternate elevation, and subsidence of it, which are observable, when any portion of it is laid bare, are owing to a very different cause from any power in itself; neither is, nor can ever be performed, until a piece of the cranium has been forcibly taken away; and consequently cannot possibly be natural, or necessary.

By blows, falls, and other shocks, some of the larger of those vessels which carry on this communication between the dura mater and the skull, are broken, and a quantity of blood is shed upon the surface of that membrane. This is one species of bloody extravasation; and indeed the only one which can be formed between the skull and dura mater. If the broken vessels be few, and the quantity of blood which is shed be small, the symptoms are generally slight, and by proper treatment disappear*.

* This must be supposed to be spoken in a general sense; because it is well known, that sometimes a very
small

If they are large, or numerous, or the quantity of extravasated fluid considerable, the symptoms are generally urgent in proportion: but whether they be slight, or considerable; whether immediately alarming or not; they are always, and uniformly, such as indicate pressure made on the brain and nerves, viz. stupidity, drowsiness, diminution, or loss of sense, speech, and voluntary motion.

This every practitioner knows to be one frequent consequence of blows on the head. But it also often happens, from the same kind of violence, that some of the small vessels which carry on the circulation between the pericranium, skull, and dura mater, are so damaged, as not to be able, properly to execute that office, although there are none so broken, as to cause an actual effusion of blood.

Smart, and severe strokes, on the middle part of the bones, at a distance from the sutures, are most frequently followed by this kind of mischief: the coats of the small vessels, which sustain the injury inflame,

small quantity of extravasated fluid, will produce the most alarming and most pressing symptoms; and that at other times a large quantity will occasion none at all.

flame, and become floughy, and in consequence of such alteration in them, the pericranium separates from the outside of that part of the bone which received the blow, and the dura mater from the inside; the latter of which membranes, soon after such inflammation, becomes floughy also, and furnishes matter; which matter being collected between the said membrane and the cranium, and having no natural outlet, whereby to escape, or be discharged, brings on a train of very terrible symptoms, and is a very frequent cause of destruction*. The effect of this kind of violence is frequently confined to the vessels connecting the dura mater to the cranium; in which case the matter is external to the said membrane; but it sometimes happens, that by the force either of the stroke or of the concussion, the vessels which

* Comment le pericrane a-t-il pû ainsi se detacher de l'os dans le circonference du coup? ne seroit ce point par l'ébranlement ou le tremouffement de toutes les parties integrantes du crane. Si c'est en consequence d'un tremouffement pareil que nombre de filets qui attachent le pericrane au crane se sont detachés, par la meme raison, plusieurs des filets qui attachent la dure mere au crane ont dû se rompre aussi: d'où s'en est suivi un erysipéle, qu'occasion suppuration, ou plutot pourriture. LE DRAN.

which pass between, and connect the two meninges, are injured in the same manner; in which case the matter formed in consequence of such violence, is found on the surface of the brain, or between the pia and dura mater, as well as on the surface of the latter; or perhaps in all these three situations at the same time.

The difference of this kind of disease, from either an extravasation of blood, or a commotion of the medullary parts of the brain, is great and obvious. All the complaints produced by extravasation, are, (as I have already said) such as proceed from pressure, made on the brain and nerves, and obstruction to the circulation of the blood through the former: stupidity, loss of sense and voluntary motion, laborious and obstructed pulse, and respiration, &c. and, (which is of importance to remark,) if the effusion be at all considerable, these symptoms appear immediately, or very soon after the accident.

The symptoms attending an inflamed, or sloughy, state of the membranes, in consequence of external violence* are very different.

* The difference between these two effects of external violence,

rent. They are all of the febrile kind; and never, at first, imply any unnatural pressure: such are, pain in the head, restlessness, want of sleep, frequent and hard pulse, hot and dry skin, flushed countenance, inflamed eyes, nausea, vomiting, rigor; and toward the end convulsion, and delirium. And none of these appear at first; that is, immediately after the accident; seldom until some days are past*.

One

violence, was very well understood by Berengarius Carpenfis, a most excellent writer on this subject, who says, “Interdum etiā a contusione non rumpitur aliqua vena, sed rumpuntur ligamenta illa duræ matris; a quibus resudat aliquid: hisce vero nisi succuratur, accidunt sæva accidentia, & mors.”

Paulus Ægineta has also very particularly distinguished between that degree of contusion, which affects only the outer table of the skull, and that which injures the dura mater. “Porro contusionis hujus duæ existunt differentiæ: vel enim calva per totam ipsius crassitiem contunditur; ut frequenter etiam cerebri membrana abscessu occupetur, vel, &c.”

* “Nulla autem harum contusionum aspectu dignosci potest; qualis nempe, quantave sit. Non protinus ab ictu malum se videndum præbet.” HIPPOCRATES. “Sed accidentia quæ sequuntur ad prædictam contusionem, *inter commissuras*, non sunt per contusionem tantum; sed sunt per *putrefactionem panniculi læsi*, et cum venit ad certam quantitatem determinatam incipit febris, et alia accidentia: & tandem sequitur mors, nisi cito succuratur.”

JACOBUS BERENGARIUS CARPENSIS.

One set or class of symptoms are produced by an extravasated fluid, making such pressure on the brain, and origin of the nerves, as to impair or abolish voluntary motion and the senses; the other is caused by the inflamed, or putrid state of the membranes covering the brain; and seldom affects the organs of sense, until the latter end of the disease; that is until a considerable quantity of matter is formed, which matter must press like any other fluid.

I am very sensible that it is a generally received opinion, that blood shed from its vessels, and remaining confined in one place, will become pus; and that the matter found on the surface of the dura mater, toward the end of these cases, was originally extravasated blood. But I apprehend both these positions to be false. That pure blood, shed from its vessels, by means of external violence, and kept from the air; will not turn to, or become matter, is (I think) proved incontestibly, by every day's experience, in many instances; in aneurisms by puncture; in retained menses, by imperforate vaginae; and in all ecchymoses. True pus cannot be made from blood merely; as may be known from the manner in which

which all abscesses are formed, and from every circumstance attending suppuration; and that the matter, found on the surface of the dura mater, after great contusions of the head, never was mere blood, I am as certain, as observation, and experience can make me.

Some of the French writers have indeed divided the symptoms of what they call a contusion of the head, into two kinds; and have named them *primitive* or *original* symptoms; and *secondary* or *consequential* ones: among the former, they rank immediate loss of sense, hæmorrhage, involuntary discharge of urine and fæces, great propensity to sleep, &c. among the latter they reckon fever, delirium, rigor, convulsion, &c. One kind they impute to the mere extravasation of blood, the other to its putrefaction.

This account, though ingenious and specious, is not founded on fact. It is true, that the two kinds of symptoms are very distinct from each other, as well in their nature, as in their time and manner of access; and so far the remark is true: but from all the observation and examination which I have been able to make, both on

the living and on the dead, they appear to me to proceed from very different causes. That both these kinds of symptoms do now and then concur in the same patient, is beyond all doubt; and that the case is thereby rendered complex, and more difficult to be judged of; but this does not constantly happen; and even when it does, I cannot help thinking, that there are generally such distinguishing characteristic marks of each, as may prove the truth of what I have asserted.

In order to explain my meaning as clearly as I can, I will consider the inflammatory effect of contusion by itself, and independent of every other complaint or injury, which may accidentally be joined with it.

If there be neither fissure nor fracture of the skull, nor extravasation, nor commotion underneath it, and the scalp be neither considerably bruised, nor wounded, the mischief is seldom discovered, or attended to for some few days. The first attack is, generally, by pain in the part which received the blow. This pain, though beginning in that point, is soon extended all over the head, and is attended with a languor, or dejection of strength and spirits, which

which are soon followed by a nausea, and inclination to vomit, a vertigo or giddiness, a quick and hard pulse, and an incapacity of sleeping, at least quietly. A day or two after this attack, if no means preventative of inflammation are used, the part stricken generally swells, and becomes puffy, and tender, but not painful; neither does the tumor rise to any considerable height, or spread to any great extent. If this tumid part of the scalp be now divided, the pericranium will be found of a darkish hue, and either quite detached, or very easily separable from the skull; between which and it, will be found a small quantity of a dark-coloured ichor.

If the disorder has made such progress, that the pericranium is quite separated and detached from the skull, the latter will even now be found to be somewhat altered in colour from a sound, healthy bone. Of this alteration it is not very easy to convey an idea by words; but it is a very visible one, and what some very able writers have noticed*.

From

* Among these Fallopius particularly: “*Inspiciatis
diligenter os detectum; quod os, quando est in natura*

From this time the symptoms generally advance more hastily and more apparently, the fever increases, the skin becomes hotter, the pulse quicker and harder, the sleep more disturbed, the anxiety and restlessness more fatiguing, and to these are generally added irregular rigors, which are not followed by any critical sweat, and which instead of relieving the patient, add considerably to his sufferings. If the scalp has not been divided or removed, until the symptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable; it will be found to be whiter, and more dry, than a healthy one, or, as Fallopius has very justly observed, it will be found to be more like a dead bone. The sanies, or fluid, between it and the pericranium will also, in this state, be found to be more in quantity, and

“ sua, est coloris subrubri, non candidi prorsus, nec ru-
 “ bri prorsus, sed est veluti color mistus ex albo declinans
 “ ad rubicundum, ut si multo lacte, aut alio colore can-
 “ dido, poneret parum sanguinis vel alterius rei rubræ.
 “ Sed si videritis inæqualitatem coloris in ipso osse de-
 “ tecto, ita ut adsint veluti puncta coloris albi, et aridi
 “ ossis, quæ aridæ particulæ aliquando majores sunt, ali-
 “ quando minores, &c. sciat quod os sit contusum.”

FALLOPIUS.

and the said membrane will have a more livid, diseased aspect.

In this state of matters, if the dura mater be denuded, it will be found to be detached from the inside of the cranium; to have lost its bright silver hue, and to be, as it were, smeared over with a kind of mucus, or with matter, but not with blood. Every hour after this period, all the symptoms are exasperated, and advance with hasty strides: the head-ach and thirst become more intense, the strength decreases, the rigors are more frequent; and at last convulsive motions, attended in some with delirium, in others with paralysis, or comatose stupidity, finish the tragedy*.

If

* The whole process of this very terrible disease is very accurately related, and very justly accounted for, by Theodoric.

“ Si vero ob ictus vehementiam, dura mater ab osse
 “ fuerit separata: vel aliquo modo læsa (sano & illæso ex-
 “ istente cranio) sic cognosces: cum dolor capitis, & lenta
 “ ebris, singulis diebus augmentantur, oculorum angu-
 “ li, ac si spasmani vellent, distorquentur; genæ rubent;
 “ (quod signum pravum est in qualibet capitis læsione;)
 “ pannus balneatus superpositus, citius deficcatur; cutis
 “ etiam arida & sicca; & si vulnus fuerit, & os disco-
 “ opertum, color ossis velocius alteratur; & propter

If the scalp has not been divided, or removed 'till this point of time, and it be done now, a very offensive discoloured kind of fluid will be found lying on the bare cranium, whose appearance will be still more unlike to the healthy natural one; if the bone be now perforated, matter will be found between it and the dura mater, generally in considerable quantity, but different in different cases and circumstances. Sometimes it will be in great abundance, and diffused over a very large part of the membrane; and sometimes the quantity will be less, and consequently the space

“negligentiam curæ, ægro superveniunt dolores, & febres, spasmus, syncope, & permistio rationis.”

THEODOR. de vuln. capit.

“Qua vero super cerebri membranam sit, utraque ratione difficilis est: nam læsis membranis apparet; ideo enim febris cum horrore, accedunt faciei rubor, & calor, longe major quam pro febris modo; somnique tumultuosi; oculi subpingues, & graviori & rubentes.”

ARCHIGENES de sanguine subtercurrent.

Petrus e Largelata, having very accurately related the symptoms attending the formation of matter under the cranium when fractured, says: “Si autem fractura sit parva & penetrans, tunc fiunt illa signa post aliquod tempus; eo quod tunc humiditates quæ sunt sub cranio putrescunt; & tunc fiunt illa accidentia;” And then very justly adds, “Secundo notes quod omnia illa accidentia possunt advenire ex percussione capitis, cranium non fracto.” PET. e LARGELATA,

space which it occupies smaller. Sometimes it lies only on the exterior surface of the dura mater; and sometimes it is between it and the pia mater; or also even on the surface of the brain, or within the substance of it.

The primary and original cause of all this, is the stroke upon the skull; by this the vessels which should carry on the circulation between the scalp, pericranium, skull, and meninges, are injured; and no means being used to prevent the impending mischief, or such as have been made use of proving ineffectual, the necessary and mutual communication between all these parts ceases; the pericranium is detached from the skull, by means of a sanies discharged from the ruptured vessels; the bone being deprived of its due nourishment and circulation, loses its healthy appearance; the dura mater, (its attaching vessels being destroyed, or rendered unfit for their office) separates from the inside of the cranium, inflames and suppurates.

Whoever will attend to the appearances which the parts concerned make in every stage of the disease, to the nature of the symptoms, the time of their access, their

progress, and most frequent event, will find them all easily and fairly deducible from the one cause, which has just been assigned, viz. the contusion. As the inflammation, and separation of the dura mater, is not an *immediate* consequence of the violence, so neither are the symptoms immediate; seldom until some days have passed; the fever at first is slight, but increases gradually; as the membrane becomes more and more diseased, all the febrile symptoms are heightened, the formation of matter occasions rigors, frequent and irregular, until such a quantity is collected, as brings on delirium, spasm, and death.

Hitherto I have considered this disease, as unaccompanied by any other, not even by any external mark of injury, except perhaps a trifling bruise of the scalp; let us now suppose the scalp to be wounded at the time of the accident, by whatever gave the contusion: or let us suppose, that the immediate symptoms having been alarming, a part of the scalp had been removed, in order to examine the skull; in short, let the injury be considered as joined with a wounded scalp.

In this case, the wound will for some little time have the same appearance as a mere simple wound of this part, unattended with other mischief, would have; it will, like that, at first discharge a thin sanies, or gleet, and then begin to suppurate; it will digest, begin to incarn, and look perfectly well. But, after a few days, all these favourable appearances will vanish; the sore will lose its florid complexion and granulated surface, will become pale, glassy, and flabby; instead of good matter, it will discharge only a thin discoloured sanies; the lint with which it is dressed, instead of coming off easily, (as in a kindly suppurating sore) will stick to all parts of it; and the pericranium, instead of adhering firmly to the bone, will separate from it, all round, to some distance from the edges.*

This

* “ Ubicunque autem ex vulnere intereundum sit, neque possit homo sanitatem recipere, neque servari, ex his intelligere convenit moriturum; ed quod futurum est prognosticare. Hyeme plerumque, ante diem quartum, æstate post septimum, accedit febris; quæ quum supervenit, vulnus reddit non sui coloris & saniem modicam effundit, quodque ex ipso inflammatum est emoritur, glutinosum efficitur, & carnem sale conditam repræsentat. Hippocrates de vuln. capit. Ulcus neque alitur neque pus maturat, & sordidum fit.”

ARCHIGENES.

This alteration in the face and circumstances of the fore, is produced merely by the diseased state of the parts underneath the skull; which is a circumstance of great importance, in support of the doctrine advanced; and is demonstrably proved, by observing that this diseased aspect of the fore, and this spontaneous separation of the pericranium, are always confined to that part which covers the altered, or injured portion of the dura mater, and do not at all effect the rest of the scalp; nay, if it has by accident been wounded in any other part, or a portion has been removed from any part where no injury has been done to the dura mater; no such separation will happen, the detachment above will always correspond to that below, and be found no where else.

The first appearance of alteration in the wound immediately succeeds the febrile attack; and as the febrile symptoms increase, the fore becomes worse and worse, that is, degenerates more and more from a healthy, kindly aspect.

Through the whole time, from the first attack of the fever, to the last and fatal period, an attentive observer will remark
the

the gradual alteration of the colour of the bone, if it be bare: at first it will be found to be whiter, and more dry, than the natural one; and as the symptoms increase*, and either matter is collected, or the dura mater becomes sloughy, the bone inclines more and more to a kind of purulent hue, or whitish yellow; and it may also be worth while in this place to remark, that if the blow was on or very near to a suture, and the subject young, the said suture will often separate in such manner as to let through it a loose, painful, ill-natured fungus; at which time also it is no uncommon

* “ Tandem subpallidum vel album se ostendit; ubi autem, jam purulentum est, aut pustulæ in lingua nascuntur, laborans mente non constante consumitur.”

HIPPOCRATES de vuln. capitis.

“ Quando sanies est infra cranium, ipso non fracto cranium est male coloratum: æger sentit gravedinem in ea parte, qua est sanies.—Est os sanum, id est illud cui adhæret dura mater, coloris albi, misti rubedine.—Et quo separatio est major, eo major ossis quantitas est mutata in colore.—Ultra vero colorem, cognoscitur etiam eo quod siccius sit sano.—Et ultra colorem, & ficcitatem quando incipit ista separatio, incipiunt alia qua sæva accidentia; & febris, mentis alienatio, stupor, vigilæ, &c. Quia incipit supra panniculum aggregari materia, quæ incipit corrumpi.”

JACOBUS BERENGARIUS CARPENSIS.

mon thing for the patient's head and face to be attacked with an erysipelas*.

I have said, that in those cases, in which the scalp is very little injured by the bruise, and in which there is no wound, nor any immediately alarming symptoms, or appearances, that the patient feels little or no inconvenience; and seldom makes any complaint, until some few days are past. That at the end of this uncertain time, he is generally attacked by the symptoms already recited. That these are not pressing at first, but that they soon increase to such a degree, as to baffle all our art; from whence it will appear, that when this is the case, the patient frequently suffers from what seems at first to indicate his safety, and prevents such attempts being made, and such care from being taken of them, as might prove preventative of mischief.

But if the integuments are so injured as to excite or claim our early regard, very useful information may from thence be collected; for whether the scalp be considerably bruised, or whether it be found necessary to divide it, for the discharge of extra-

* “Suturas tempore curationis disjungi grave est.”

extravasated blood ; or on account of worse appearances, or more urgent symptoms, the state of the pericranium may be thereby sooner, and more certainly known : if in the place of such bruise, the pericranium be found spontaneously detached from the skull ; having a quantity of discoloured sanies between them, under the tumid part, in the manner I have already mentioned ; it may be regarded as a pretty certain indication, either that the dura mater is beginning to separate in the same manner ; or that if some preventative means be not immediately used, it will soon suffer ; that is, it will inflame, separate from the skull, and give room for a collection of matter between them. And with regard to the wound itself, whether it was made at the time of the accident, or afterward artificially, it is the same thing ; if the alteration of its appearance be as I have related, if the edges of it spontaneously quit their adhesion to the bone, and the terrible symptoms are at the same time making their attack, these circumstances will serve to convey the same information, and to prove the same thing*.

This

“ Si dans une playe contuse, où le crane est decou-

“ vert,

This particular effect of contusion is frequently found to attend on fissures, and undepressed fractures of the cranium; as well as on extravasations of fluid, in cases where the bone is entire: and, on the other hand, all these do often happen without the concurrence of this individual mischief. All this is matter of accident; but let the other circumstances be what they may, the spontaneous separation of the altered pericranium, in consequence of a severe blow, is almost always followed by a suppuration between the cranium and dura mater, a circumstance extreamely well worth attending to in fissures and undepressed fractures of the skull; because, it is from this circumstance principally, that the bad symptoms, and the hazard, in such cases arise.

It is no very uncommon thing for a smart blow on the head to produce some immediate bad symptoms; which after a short space of time disappear, and leave the patient perfectly well. A slight pain in the head,

“ vert, on trouve à la circonference de la playe, que
 “ le pericrane tiennent peu à crane, ou en soit detaché,
 “ c’est une preuve certaine que le crane a souffert, quoi-
 “ qu’il ne soit fracturé; & s’il a souffert, on peut être as-
 “ suré que la dure mere a souffert aussi.” LE DRAN.

head, a little acceleration of pulse, a vertigo and sickness sometimes immediately follow such accident, but do not continue many hours; especially, if any evacuation has been used. These are not improbably owing to a slight commotion of the brain; which having suffered no material injury thereby, soon cease. But if after an interval of some time, the same symptoms are renewed; if the patient, having been well, becomes again feverish, and restless, and that without any new cause; if he complains of being languid and uneasy, sleeps disturbedly, loses his appetite, has a hot skin, a hard quick pulse, and a flushed, heated countenance, and neither irregularity of diet, nor accidental cold, have been productive of these, mischief is most certainly impending, and that most probably under the skull.

If the symptoms of pressure; such as stupidity, loss of sense, voluntary motion, &c. appear some few days after the head has suffered injury from external mischief, they do most probably imply an effusion of a fluid somewhere: this effusion may be in the substance of the brain, in its ventricles, between its membranes, or on the surface
of

of the dura mater: and which of these is the real situation of such extravasation is a matter of great uncertainty; none of them being attended with any peculiar mark, or sign that can be depended upon, as pointing it out precisely: but the inflammation of the dura mater, and the formation of matter between it and the skull, in consequence of contusion, is generally indicated and preceded by one which I have hardly ever known to fail; I mean a puffy, circumscribed, indolent tumor of the scalp, and a spontaneous separation of the pericranium, from the skull under such tumor*.

These appearances therefore following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, head-ach, and slight, irregular shiverings, do almost infallibly indicate an inflamed

* Lorsqu'on trouve le pericrane detaché, il n'y a point a hesiter a faire le trepan. Je sçais que dans un cas pareil on n'auroit rien trouvé d'épanché sous le crane, mais cependant l'operation faite de bonne heure auroit été l'unique moyen de sauver le malade s'il étoit possible, &c.

Si donc plusieurs experiences nous apprennent que la dure mere devient malade en consequence de la contusion de l'os, & que sa maladie degenerate en pourriture, ce que a jusqu'ici emporte plusieurs malades malgré de recours usités, il faut absolument trepanner de bonne heure.

LE DRAN.

flamed dura mater, and pus, either forming or formed between it and the cranium*.

By detachment of the pericranium, I do not mean every separation of it from the bone which it should cover. It may be, and often is, cut, torn, or scraped off, without any such consequence: but these separations are violent; whereas, that which I mean is spontaneous, and is produced by the destruction of those vessels, by which it was connected with the skull, and by which the communication between it, and the internal parts was carried on; and therefore it is to be observed, that it is not the mere removal of that membrane which causes the bad symptoms, but it is the inflammation of the dura mater; of which inflammation, this spontaneous secession of the

* Si statim ab initio febris primo aut secundo appareat die, illa proculdubio causam agnoscat perturbationem humorum, ac animi, quum vulnus incuteretur; cessante causa procatartica; ac ubi se collegerit æger, desinat illa febricula. Si vero primis diebus, nihil febrile, nec ullum symptoma sentiat æger, seque in nullo discrimine existimat, hunc si subito, die scilicet septimo, vel quarto decimo (nihil licet in victu, rebusve externis peccaverit æger) ac præter expectationem febris invadat, significat latens aliquod, in cranio, cerebro, aut corpore vulnerati.

PET. PAAW. in HIPPOCRAT.

the pericranium is an almost certain indication.

A false notion prevailed for many years, that the dura mater was not in general connected with the internal surface of the skull, except at the sutures; and that in all other parts of it, such a vacancy was left, as gave free room for what they called its pulsatory motion*. This opinion, which was embraced

* If we consider how clearly and plainly many of the best antient writers describe the intimate connexion between the skull and dura mater; and how perfectly well acquainted many of them were with its morbid separation; we shall wonder how it came to be again forgot; but that it was is most certain. In Hippocrates, Paulus Ægineta, Rhazes, and others, are many passages which prove their knowledge of the natural structure and adhesion of this membrane; and that some of the most eminent writers, and practitioners, had forgot, or did not attend to it, the following quotations, selected from many more, may convince.

“ Dura mater calvariae connectitur futurarum ope ut
 “ pensile & erectum teneat cerebrum; tum etiam ut per
 “ futuras egressa pericranium procreat: spatium vero inter
 “ futuras recte natura liberum reliquit ut vacuum quod-
 “ dam esset inter duram matrem & calvariam; has nimi-
 “ rum ob causas; primo ne quicquam cerebri systolæ &
 “ diastolæ obstaret; secundo ne venæ, & arteriæ per exter-
 “ nam duræ matris partem sparsæ levi aliquo ictu in
 “ cranio factò rumperentur; postremo ut ruptis in duræ
 “ matre venis, sanguis non inter duram & piam matrem,
 “ sed inter duram & cranium effunderetur, & cranio per-

“ forato

braced by many, even of the most eminent practitioners, was the principal reason, why the bad effects of contusions of the head were so little understood, and so grossly mistreated by them. They supposed that

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the

“forato facilius extraheretur. Et hic est ordinarius naturæ ordo.” GUL. FAB. HILDANUS.

Felix Wirtz says, that the elevation of the cranium in slight impressions is needless, “Id enim motum cerebri, propter *vacuum* & distantiam quæ est inter meningem & cranium, minime impedire.” And Hildanus, by way of reproof to what Felix Wirtz says: “Aliquando duram matrem cranio undique adhærere vidimus.”

Fallopious, speaking of the dura mater, says: “Continuo pulsatur, quare non facile sanatur.”

Petrus e Marchetti supposed the dura mater always to be at a distance from the skull in those who were bald. Speaking of the treatment of a particular case he says: “Post septimam nempe oleum hyperici, quia calvus erat patiens atque membrana a calvaria distabat; quod in calvis semper observavi.”

PET. e MARCHETTI Obs. Chir.

“Aliquando contingit ut dura mater cranio satis firmiter adhæreat, sed hæc admodum raro evenire solet, atque præter naturæ consuetudinem est.”

MUYS Prax. Rat. Chirurg.

This was also the opinion of Sylvius, Pacchioni, Ambrose Paré, Serjeant Wiseman, Baglivi, Barbette, and of all those who maintained the doctrine of the oscillation of the dura mater; and who believed that that membrane was found sometimes higher, sometimes lower, that is, sometimes nearer to, sometimes farther from the skull, at one age, and at one time of the moon, than another.

the vacuity between the dura mater and cranium, was sufficient in general, to defend the former from all external violence : and the blood and matter, so often found between them, were thought to be deposited in a space naturally vacant. Upon this principle stood both their opinion and practice ; and therefore it is not to be wondered at, that their accounts, in general, are so perplexed, and so seldom verified by the examination of dead subjects.

It sometimes happens, that the scalp is so wounded at the time of the accident ; or so torn away, as to leave the bone perfectly bare, and yet the violence has not been such, as to produce the evil I am now speaking of. In this case, if the pericranium be only turned back, along with the detached portion of scalp, there may be probability of its re-union ; and it should therefore be immediately made clean and replaced, for the purpose of such experiment, which, if it succeeds, will save much time, and prevent considerable deformity. If this attempt does not succeed, the detached piece may be removed ; and the case then becomes, as if the scalp and the pericranium had been forced away, at the time that the wound

was

was first inflicted; and the worst that can happen, is an exfoliation from the bare skull.*

It does also sometimes happen, that the force which detaches or removes the scalp, does also occasion the mischief in question; but the integument being wounded, or removed, we cannot have the criterion of the tumor of the scalp, for the direction of our judgment. In these circumstances our whole attention

* Not that exfoliation is the necessary consequence of the skull being laid bare: this depends upon other circumstances, besides the mere removal of the scalp, and pericranium. The solidity of the surface of the bones, the size of the vessels, and the impulse of the blood through them, are what principally determine that. If the cortex of the bone be not very hard, and the impulse of the blood be capable of counterbalancing the effects of the external air, a granulation of flesh will be generated on the surface of the bone, which will cover, and firmly adhere to it, without throwing off the smallest exfoliation; especially in young subjects. On the contrary, if the bone be much hardened, and the vessels thereby constricted; or if such applications be made use of, as will produce an artificial constriction of them, the surface will necessarily become dry, and the juices ceasing to circulate through it, it must part with a scale to a certain depth; that is, that part of the surface through which the circulation ceases to be carried on, will be separated from, and cast off by, the vessels which nourish the rest of the bone.

attention must, (as I have already said) be directed to the wound and general symptoms. The edges of the former will, (as I have already observed) digest as well, and look as kindly, for a few days, as if no mischief was done underneath; but after some little space of time, when the patient begins to be restless, and hot, and to complain of pain in the head, these edges will lose their vermillion hue, and become pale and flabby; instead of matter they will discharge a thin gleet, and the pericranium will loosen from the skull, to some distance from the said edges. Immediately after this, all the general symptoms are increased, and exasperated, and as the inflammation of the membrane is heightened, or extended, they become daily worse and worse, until a quantity of matter is formed, and collected, and brings on that fatal period, which, though uncertain as to date, very seldom fails to arrive.

The method of attempting the relief of this kind of injury consists in two points, viz. to endeavour to prevent the inflammation of the dura mater; or, that being neglected, or found impracticable, to give discharge to the fluid collected within
the

the cranium, in consequence of such inflammation.

Of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy. To this truth many diseases bear testimony; pleurifies, ophthalmies, strangulated hernias, &c. and if any thing can particularly contribute to the prevention of the ills likely to follow severe contusions of the head, it is this kind of evacuation; but then it must be made use of in such a manner as to become truly a preventative; that is, it must be made use of immediately, and freely.

I am very sensible, that it will in general be found very difficult to persuade a person, who has had what may be called only a knock on the pate, to submit to such discipline, especially, if he finds himself tolerably well. He will be inclined to think, that the surgeon is either unnecessarily apprehensive, or guilty of a much worse fault; and yet, in many instances, the timely use, or the neglect, of this single remedy, makes all the difference between safety, and fatality.

It may be said, that as the force of the blow, the height of the fall, the weight of

the instrument, &c. can never precisely or certainly determine the effect, nor inform us whether mischief is done under the bone or not, a large quantity of blood may be drawn off unnecessarily, in order to prevent an imaginary evil. This is in some degree true; and if the advice which I have just given was universally followed, many people would be largely bled without necessity; but then, on the other hand, many a very valuable life would be preserved, which for want of this kind of assistance is lost. “*Nihil interest, præsidium an satis tutum sit, quod unicum est,*” is an incontestable maxim in medicine; and if it be allowed to use such means, as may be in themselves hazardous, surely it cannot be wrong to employ one which is not so; at least, if it be considered in a general sense; whatever it may accidentally prove to some few particular individuals.

Acceleration, or hardness of pulse, restlessness, anxiety, and any degree of fever, after a smart blow on the head, are always to be suspected and attended to. Immediate, plentiful, and repeated evacuation by bleeding, have, in many instances removed these, in persons to whom, I do verily believe,

lieve,

lieve, very terrible mischief would have happened, had not such precaution been used. In this, as well as some other parts of practice, we neither have, nor can have any other method of judging, than by comparing together cases apparently similar. I have more than once or twice seen that increased velocity and hardness of pulse, and that oppressive languor, which most frequently precede mischief under the bone, removed by free and repeated blood-letting; and have often, much too often, seen cases end fatally, whose beginnings were full as slight, but in which such evacuation had been either neglected or not complied with.

I would by no means be thought to infer from hence, that early bleeding will always prove a certain preservative; and that they only die to whom it has not been applied: this, like all other human means, is fallible, and perhaps there are more cases out of its reach, than within it; but where preventative means can take place, this is certainly the best, and the most frequently successful.

The second intention, viz. the discharge of matter collected under the cranium, can be answered only by the perforation of it.

When, from the symptoms and appearances already described, there is just reason for supposing matter to be formed under the skull, the operation of perforation cannot be performed too soon; it seldom happens that it is done soon enough*.

The propriety or impropriety of applying the trephine, in cases where there is neither fissure, fracture, nor symptom of extravasation, is a point which has been much litigated, and remains still unsettled either by writers or practitioners.

When there is no reason for suspecting either of those injuries, either from the symptoms, or from the appearances; and the pericranium, whether the scalp be wounded or not, remains firmly attached in all parts to the skull, there certainly is not, (let the general symptoms be what they may) any indication where to apply the instrument; and consequently no sufficient authority for using it at all. But whenever

* “His, ubi cito manus admoveatur, salutis aliqua spes subest; ubi serius, plerique omnes moriuntur.”

ever that membrane, after the head has received an external violence, separates, or is detached spontaneously from the bones underneath it; and such separation is attended with the collection of a small quantity of thin, brown ichor, an alteration of colour in the separated pericranium, and an unnatural dryness of the bone, I cannot help thinking, that there is as good reason for trepanning, as in the case of fracture; I believe experience would vindicate me, if I said, better reason; since it is by no means infrequent, for the former kind of case to do well without such operation; whereas the latter (I mean suppuration under the skull) never can*.

All the best practitioners have always agreed in acknowledging the necessity of perforating the skull in the case of a severe stroke made on

* “ Les auteurs jusqu’ici, ne nous ont parlé du trepan
 “ qu’ autant qu’ il pouvoit servir a relever des pieces
 “ du crane enfoncées, par un coup violent, ou a donné
 “ issue a quelque liqueur, comme seroit du sang, ou du
 “ pus, épanché, sous le crane,

“ La contusion de l’os est un cas, ou le trepan n’est pas
 “ moins nécessaire; non a cause que l’os est contus, mais
 “ pour prevenir la maladie de la dure mere, & de la pie
 “ mere; qui en est une suite presque indispensable.”

LE DRAN,

on it, by gun-shot, upon the appearance of any threatening symptoms, even though the bone should not be broken: and very good practice it is. A wound by gun-shot, (as far as it relates to the skull) is to be regarded only as one attended with a very high degree of contusion; and therefore most likely to produce symptoms accordingly; among which, inflammation of the dura mater stands principal. Experience confirms both; most of the symptoms, attending wounds of the head, made by gun-shot, are symptoms of contusion: and the formation of matter between the cranium and dura mater, is a very frequent, and a very fatal consequence of such contusion.

In short; the spontaneous separation of the pericranium, if attended with general disorder of the patient, with chilliness, horripilatio, languor, and some degree of fever, appears to me, from all the observation I have been capable of making, to be so sure and certain an indication of mischief underneath, either in present, or impending, that I should never hesitate about perforating the bone in such circumstances.

When

When the skull has been once perforated, and the dura mater thereby laid bare ; the state of the latter, must principally determine the surgeon's future conduct. In some cases, one opening will prove sufficient for all necessary purposes, in others several may be necessary. This variation will depend on the space of detached dura mater, and the quantity of collected matter. The repetition of the operation is warranted, both by the nature of the case, and by the best authorities, there being no comparison to be made between the possible inconvenience arising from largely denuding the dura mater, and the certain, as well as terrible evils, which must follow the formation and confinement of matter between it and the skull.

It can hardly be necessary for me to observe, to whoever reflects ever so little on the true nature of these cases, that notwithstanding the operation of perforation be absolutely and unavoidably necessary, yet the repetition of blood-letting, of cooling laxative medicines, the use of antiphlogistic remedies, and a most strict observance of a low diet and regimen, are as indispensably requisite, after such operation, as before :

fore : the perforation sets the membrane free from pressure, and gives vent to collected matter, but nothing more : the inflamed state of the parts under the skull, and all the necessary consequences of such inflammation, call for all our attention, full as much afterwards as before : and although the patient must have perished without the use of the trephine, yet the merely having used it will not preserve him, without every other caution and care.

This being all that our art is capable of doing in these melancholy cases, I wish I could say, that it was most frequently successful. Sometimes it is : the operation, considered abstractedly, is not in itself hazardous, and is the unicum remedium, for the most immediately impending, and most threatening mischief ; some have been saved by it ; none can escape without it ; as there are no certain indications, no criteria, whereby we are enabled to judge, whether it will prove successful, or not, the event of each individual case can alone determine. When that is happy, the means are very justly commended ; but when it is not so, they ought not therefore to be condemned ;

demned; since they are built on very rational principles, and are the only means in human power.

C A S E I.

A Poor fellow crossing Tower-hill, got, before he was aware of it, into a mob, that was endeavouring to rescue a sailor from a press-gang. The man was knocked down. When the croud dispersed, he was found senseless, and in that state was brought to St. Bartholomew's hospital; where he was immediately let blood, and put to bed. In an hour or two, he was so recovered, as to be able to give the preceding account.

When Mr. Nourse (whose week it was for accidents) saw him the next day, the man appeared to be perfectly well; nor did any mark of violence appear on his head, except one small bruise; and that so slight, that it might, with more probability, be attributed to the fall, than the blow. However, as he was positive, that he had been knocked down, by a very smart blow, from a heavy weapon; and as he certainly had
been

been deprived of sense a considerable time thereby; Mr. Nourse bled him again, and ordered him to be kept in bed, and to a very low diet. At the end of three days the man found himself so well, as to leave the hospital, and go to work. On the twelfth day from that of the accident, he came to my surgery, and complained of being much out of order; said, that his head was very uneasy; that he was hot, thirsty, got little or no sleep, and was, at times, so faint that he could not pursue his labour. He looked ill, assured me he had lived very soberly, from the time of his leaving the hospital, and that he had been in his present state for three days past. I took him into the house again, bled him, ordered him a glyster immediately, and that he should be kept in bed.

Next day, (13th) he was in much the same state as the preceding: he had passed a restless night, had dozed now and then, but awoke with much disturbance. He had a hot skin, and a flushed countenance, mixed with a light yellow tint; he complained of general pain and tightness all over his head; but neither to the sight, nor to the touch, was there any appearance, or sensation,

sensation, whereon to build a probable supposition, of particular mischief. He was again, by the physician's order, let blood, and directed to take the *sal absinthii* mixture, with a few grains of rhubarb in it, every six hours. He passed the ensuing night in a disturbed manner, and the next day, (the 14th) was apparently worse: his skin was hotter, his pulse quicker, and his pain more acute; he also now thought, that one part of his head was tender to the touch; and said, he was sure, that was the part which received the blow. This place I examined. The scalp did seem to be rather fuller than natural, but by no means sufficiently so, to enable me to form any judgment by. Toward the close of this day he had a slight shivering, was sick, and vomited, and passed the following night without any sleep at all; talking sometimes incoherently, but still capable of giving a rational answer to any question which engaged his attention. On the 15th day, the tumor of the scalp was more apparent, but yet seemed to contain little or no fluid, and was about the breadth of a crown piece. I would have removed that portion of scalp; but while I was intending it, the poor man

had a very severe rigor, which disordered him so much, that he begged to be let alone for the present. That afternoon he had two more shiverings, passed very ill the following night; and next morning was delirious. The tumor now was more risen, contained palpably a fluid, but was by no means tense; I took away the whole tumid piece, by a circular incision; gave discharge to a thin brown sanies, and found the cranium perfectly naked, altered considerably in colour from that of a healthy natural one, but without fissure, fracture, or other evil. That whole night and next day he was delirious; his skin burning hot; he had frequent spasms, which shook his whole frame, and that night (the 17th) he died.

The whole scalp, except round the edge of the incision, was in a natural state; the pericranium in every other part, except the tumid one, adhered to the bone; and neither inflammation, nor tumor of any kind all over the rest of the head. Under that part of the skull from which the pericranium had been detached, and from which the scalp had been removed, a very considerable collection of matter was found lying between the dura mater and cranium,
but

but no appearance of disease any where else.

C A S E II.

Contusion with wound.

A Young fellow, playing at quoits, was struck down by the perpendicular fall of one of them on his head. It made a large wound, which bled freely, but did not divide the pericranium, and consequently did not denude the skull. The wound was brought together by a stitch, made by somebody at hand; and the man, though stunned at first by the blow, having vomited plentifully, was soon well, and the next day went to his work, which was that of a farrier. The wound was dressed daily with a superficial pledgit, by the person who first saw and stitched it; and it seemed to unite kindly.

On the sixth day from that of the accident, he complained of being chilly and faint; and when he had done about half a day's work, found himself unable to bear the heat of the forge, or to stoop to shoe an horse, on account of pain in his head: he therefore left his shop, went home, and sent

for the apothecary who first had dressed him. The wound not being very carefully examined appeared to be healed, and therefore was not regarded as any cause of the man's present indisposition, who was treated as having a fever, from cold, and irregularity : he was let blood, and took some medicines ; but at the end of three days, (nine from the accident) being worse, and incapable of bearing the expence of remaining at home, he was brought to St. Bartholomew's hospital. On the tenth day, from that on which he was wounded, I saw him. He had a considerable degree of fever ; his pulse was hard and quick, his skin hot and dry, his face flushed, his eye languid, and he complained of great pain and tightness all over his head. The wound was apparently, but not really healed ; I could pass a probe underneath, from one end to the other of it ; and I could feel the cranium bare the whole way. I divided its whole length ; found the pericranium floughy, and detached to a considerable distance, and the bone much altered in colour : upon sight whereof, I removed the whole separated part, by a large circular incision.

From

From the symptoms and appearances I prognosticated no good. He was again let blood, and had a glyster, and a lenient purge, which together produced three stools. That night, (the 10th) he had a rigor, after which his pain became more intense, and fever higher. The next morning, (the 11th) he had another shivering; and when I saw him about noon, he was very inconsistent. I set on a trephine close to the fagittal future, on one side; and gave discharge to a small quantity of matter, which lay on the surface of the dura mater; after being lightly dressed, some more blood was drawn from one of the jugular veins, and he was ordered to take a draught of the salt of wormwood mixture frequently. The next day, (12th) he was worse. I therefore set the trephine on again, but on the other side of the future, and by that means let out a considerable quantity of matter from between the skull and membrane. Soon after this, he became more rational, and seemed to get a little sleep; but in the evening his pain returned with great violence, and he had a rigor, which held him above an hour.

When I saw him the next day, (13th) he was senseless, had a low faltering pulse, and a profuse cold sweat; soon after which he expired.

Upon removing the upper part of the skull, a large quantity of matter was found, under each parietal bone, which had detached the dura mater from its connexion with the skull, for a considerable space, but not at the suture. On the right side a portion of the dura mater was become sloughy, about the breadth of a shilling; and under this altered part, was matter between the two meninges.

The more firm attachment of the dura mater at the sutures, renders the separation of it at these places very difficult: which circumstance, added to the consideration of the situation of the sagittal suture on the very top of the head, renders the application of the trephine on each side of it often absolutely necessary. For if there be good reason to suspect either an extravasation of blood, or a collection of matter, in consequence of a blow received on this suture, and one side only be perforated, the operation may happen to be performed on that side where the blood or matter does not lie, and will therefore

therefore be fuccefslefs ; or, on the other hand, the extravafation, or fuppuration, may be on both fides ; and then the perforation of one only cannot anfwer the whole purpofe, and the patient will as certainly perifh as if nothing had been done at all.

C A S E III.

Contufion without wound.

A Boy about nine years old, playing under an empty cart, whose fhafts were fupported by a ftick, was knocked down, by the fall of one of them upon his head. The child was ftunned by the blow for a minute or two, but foon became fenfible. When he came home, there being a fmall fwelling where the blow had been ftricken, his mother applied a bit of linen rag, wet with vinegar ; and as he appeared to be perfectly well in a day or two, he was fent to fchool.

Five days paffed over before he made any complaint ; on the fixth, he faid, that his head ached ; he brought up his breakfast, and could eat no dinner ; but in the evening feemed to be pretty well again. On the

7th, he complained still more of his head; and said, that he was very sick, and very cold. He was put to bed, but got no rest. As he had not had either small-pox, or measles, he was brought home, and treated as if one of these diseases was to follow.

Three days more passed, and no eruption appeared: the fever continued much the same; he was frequently inclined to vomit, and what little sleep he got, was extremely disturbed. He was, by the order of a physician, let blood, had a blister applied to his back, and took some of the common febrifuge medicines. On the 12th day, from that of the accident, he was seized with a shivering, which held him more than a quarter of an hour; after which his pain became more acute, and his fever higher. Some blood was drawn from his temples by leeches, and he was ordered some other medicines. On the 13th, at noon, he had another rigor, still more severe than the former, and of longer duration; and that evening he became light headed. By some means or other, the accident of the blow was now mentioned to the person who attended him; and who desired that a surgeon might look at his head. I found about

bout a third part of the left parietal bone covered by a flattish tumor, containing a fluid.

From the appearance of this swelling, from the date of the accident, the attack, violence, and duration of the symptoms, I made no scruple to give my opinion, that the blow had been the sole cause of all the child's illness; that I suspected the skull under the tumor to be bare, if not injured; that I did also believe, that matter was forming, or formed, under the skull; and, that if the last conjecture was true, the only chance the child could have of preservation, must be from the operation of the trephine.

The scalp was divided, and the skull found as I suspected, that is, perfectly bare, and altered from a natural colour; I would therefore have perforated it immediately; but as the bone was not broken, the parents objected to such operation; and the physical gentleman, who had the care of the boy, not having seen much business of this kind, and not rightly comprehending the true nature of the case, joined in opinion with the parents, that such operation was not necessary. It was therefore not performed,

performed, and the whole was committed to internal remedies.

The fever increased, and the child's strength decreased in proportion: he continued delirious for three days more, then sank into a state of insensibility, and died.

Having been contradicted, and (as I thought) some what improperly overruled, in the management of the patient while alive, I was the more importunate to get leave to examine him when dead.

All that part of the dura mater which had been covered by the left parietal, and part of the temporal bone, was detached from the said bones, and covered with a considerable quantity of matter. Under the middle part of the former bone, the dura mater was discoloured, and sloughy; this discoloured part I opened with a lancet, and let out near a spoonful of matter; which matter lay between the meninges. All the rest of the contents of the head were unaffected.

When first I saw this child, all chance of relief from evacuation was over; and his symptoms plainly indicated mischief under the skull. Nothing therefore but per-

perforation could give him any kind of chance.

I do not say, that this operation would have saved him ; I am much inclined to believe that it would not ; but still it was the only thing, that could with propriety have been done for him ; and therefore it ought to have been done, instead of wasting time with the use of internal remedies, from which no possible good could be expected, or derived.

C A S E IV.

Contusion without wound.

A Labouring man fell from a scaffold, two stories high, by which he was for a few minutes stunned, and insensible, but soon recovered. He was let blood ; and having bruised his right arm, and the same side of his forehead, he was properly dressed, by some body in the neighbourhood.

Next day being very well, he returned to his labour, and followed it daily for five more. On the sixth, finding himself a good deal out of order, he came to the hospital

hospital for advice. He complained, of shooting and frequent pain in his head; of giddiness, and inclination to vomit; and said, that he felt, as if a cord was drawn tight round his brain. On the right side of his forehead was a small tumor, neither tense, nor painful, but palpably containing a fluid. I persuaded the man to let me open it. I found a small quantity of a brown fluid, covering the bone, perfectly denuded of its periosteum; upon which discovery, I removed the whole piece by a circular incision; fourteen ounces of blood were drawn from his arm; a glyster was thrown up, and he was confined to his bed, and barley water.

Next morning, (the seventh) his pulse was full, hard, and frequent; he had slept very little, and that in a very disturbed manner. He was, by the physician's order, let blood again, and directed to take the sal abfinthii mixture, with rhubarb sextis horis. On the eight day, he was let blood again from one of the jugulars; and being still rather costive took a gentle purge. On the ninth, his pulse was still higher and harder, and his skin more hot and dry; twelve ounces more of blood were drawn off

off from one of the temporal arteries. That evening he had a shivering; after which he complained that his pains were much increased. Next morning, (the tenth) his face looked very ill; was pale, spongy, and glassy, and the scalp separated from the skull to some distance beyond the edges of the wound. I set on a trephine, and removed a piece of the cranium, under which the dura mater was smeared over with matter, and had lost its bright colour. That night he got no sleep, and toward morning had another rigor. The eleventh, at noon, he was manifestly worse, in every respect; his pain was intense his fever high, and his face as ill-conditioned as possible. With the largest trephine I had, I took away another piece of the cranium, nearer to the temporal bone, and by means of this opening, procured the discharge of a considerable quantity of matter. This done, finding his pulse still high, and full, I drew off ten ounces more of blood, and ordered him a glyster. The loss of blood produced a swooning, which lasted some minutes; after which, he said, that he thought his head was rather easier. As the evening approached, his pain returned, wherefore some leeches were

were applied to his temples. That night he got a little quiet sleep, and in the morning of the twelfth day, said that his head was perfectly easy: a very large discharge of matter had been made through the perforation in the cranium, and I thought that the wound of the scalp wore rather a better aspect. He was kept strictly to a proper low regimen; took at first the *sal absinthii* mixture freely; when his pain had left him, the physician ordered him the bark; and in a very few days every bad symptom and appearance left him.

Would not this case, which ended so happily, have been attended with the most fatal consequences, if the free perforation of the skull had been omitted, or if less blood had been drawn off.

C A S E

C A S E V.

Contusion with wound.

A Young fellow of about twenty years, was thrown from an unruly horse, against one of the rails in Smithfield. The blow was great; he lay senseless for above an hour, and in that state was brought into St. Bartholomew's hospital.

He had a large wound on one side of his forehead, the skin of which was partly torn quite off, and partly turned down over his eye. The lips of the wound were, by the person who saw him first, brought as near together as they would admit; but such a portion was lost, as necessarily left the bone bare about the breadth of a shilling. As soon as his wound had been examined, he was let blood and put to bed. The next day, his pulse being hard and full, he was again let blood, and was ordered to have a glyster, a lenient purge, and some febrifuge medicines. On the third, the wounded scalp, and that side of the face being much swollen, a warm cataplasm was applied over the dressings, and the part was well fomented; and in about five days more, every thing

thing wore so good an aspect, that the man seemed to be getting well apace. On the ninth, he complained of being out of order, said his head ached, and that he had not slept the preceding night. He was hot and feverish, and his pulse hard and full. He was therefore let blood again, and ordered to have a glyster, and to be kept very low. On the tenth, in the night, he had (as he called it) a chilliness came all over him; after which, his pain was considerably increased. On the eleventh, his sore seemed to spread, discharged a thin gleet instead of matter; the lint with which it was dressed, stuck fast to all parts of it; and its surface, from having been florid and granulated, became tawny and spongy. That day he had another shivering; and on the next, being the twelfth, a consultation was held on him. He was now very hot and feverish; his face much flushed, an erysipelas beginning to appear on his eye-lids; his sore very ill-conditioned, and the bare bone so much changed from its natural colour, that it looked as if matter might have been seen through it. Consideratis considerandis, it was agreed that he had no chance for his life but by perforation

ration of the bare cranium. The operation was immediately performed, and a quantity of matter found on the dura mater. For several days the discharge was great, and the man continued very ill ; but about the eighteenth day the fever left him ; he became easy, the discharge lessened, his face put on a good face, and he got a natural sleep. From this time nothing sinister happened, and the man got soon well.

C A S E VI.

Contusion without wound.

A Lad about twelve years old, standing by a man who was playing at cricket, received a blow from the bat on his forehead. The boy became senseless, and as he was not known to any body present, he was brought to the hospital. He recovered his senses before he got thither ; but the part which received the stroke being much swollen, he was dressed, let blood, and ordered to keep in bed. When I saw him next morning he had no complaint, but the foreness of his forehead, under the skin of which there seemed to be a good deal of

extravasated, coagulated blood. His pulse was full and strong; he was therefore again let blood: and as he had not had a stool for two days, a glyster was thrown up, and a lenient purge given. A discutient cerate was kept upon his forehead; and being of a costive habit, he was purged once in two or three days; and on the ninth, from that of the accident, was discharged from the house. On the fourteenth, he returned to it again, complained of lassitude, giddiness, and head-ach. He was put under the care of the physician, was let blood, vomited, purged, and took proper medicines; but remained much the same for three or four days: that is, he was feverish, with a skin too hot, a pulse too quick, and what little sleep he got was unquiet, and short. On the seventeenth day he had a slight rigor, during and after which his pain in the head was much more intense, and the following day all his febrile symptoms were much exasperated; on the nineteenth, he complained of tenderness to the touch on his forehead, and great general pain in his head. He was again let blood, and was more sunk by the discharge than I could have supposed; but no remission of his symptoms followed.

His

His sleep that night was very little, and very unquiet; toward morning he had two distinct shiverings; and when I saw him at noon, on the twentieth, his forehead appeared somewhat tumid and puffy. From the continuance and exasperation of his symptoms, and from the new appearance on his forehead, I was almost certain there was mischief on or under the skull; I therefore divided the scalp, to examine the bone; and found, between it and the pericranium, which had quitted its adhesion for more than the breadth of a crown-piece, a small quantity of a thin, discoloured fluid.

This (as it appeared to me) put the nature of the case out of doubt, and left the boy no chance, but from perforation. I therefore applied the trephine immediately, and gave discharge to matter formed between the dura mater and bone. For a week after the operation, the discharge was large, and the boy in much hazard; but at the end of that time, the suppuration lessened; the dura mater incarned kindly; and by proper care, and taking freely of the decoct. cortic. peruv. he got well.

C A S E VII.

Contusion without wound.

A Man in the neighbourhood of St. Giles's had a quarrel with his wife; in which he struck her over the head with a mop-stick. The blow was a smart one; but as it neither fetched blood, nor brought her to the ground, it only finished the dispute, and no farther notice was taken of it. The woman followed her business, which was that of crying greens about the streets, and lived, (to use her own words) sometimes drunk, sometimes sober, for a week. On the eighth day from that of the blow, she found herself so ill, that she applied to the hospital for admission; and was taken in as a physician's patient for a fever. The doctor wrote for her; and the day after this, (the tenth from the accident) the sister of the ward, in cutting off the patient's hair, which was full of vermine, discovered a swelling, which she desired me to look at: it was flattish, about the breadth of the palm of a hand; and lay immediately a-cross the sagittal future. The woman

man had now a hard, full pulse, a hot dry skin, a black tongue, a frequent inclination to vomit, great thirst, intense pain in her head, and got no sleep. From these symptoms and appearances, and from the account which the woman now first gave of the blow, I made no hesitation to say, such blow was the cause of all her symptoms. That night she had a severe rigor; and the next day, the eleventh, an erysipelas had taken possession of part of her visage. I opened the tumour, and finding the bone bare, cleared away the scalp largely, and circularly. I then applied a trephine on one side of the future and close to it; and found the dura mater altered in its natural colour, and as it were smeared over with matter. She passed the succeeding night very ill, was in great pain, got no sleep, and had two shiverings. When I came to her the next day, her whole visage was covered with an erysipelas, and so swollen, that she could not open her eye-lids. I applied the trephine on the other side of the future, and found the same appearance, viz. matter on the surface of the membrane. She had within the last two days been let blood three times; and had constantly taken

such medicines as the physician had ordered for her, and which were calculated to abate her fever, and keep her body open. Her symptoms still continued without abatement; the wound of the scalp bore as bad an aspect as possible, she talked very inconsistently, got not a wink of sleep, and called perpetually for drink. As the quantity of bone made bare by the removal of the scalp gave room for the farther application of the instrument, I made a third perforation near to the first, and immediately gave thereby discharge to so large a quantity of matter, as to satisfy me the event must be fatal.

The next day the right arm and leg became paralytic, and the day following that, from having been raving, she sunk into a state of perfect insensibility, had a short, laborious respiration, a small, interrupted, faltering pulse, and cold extremities; and on the sixteenth day from that of the accident she died.

Upon opening the head, the dura mater was found covered with matter, under the whole internal surface of both the parietal bones; but the firm adhesion of the longitudinal sinus to the sagittal suture had prevented

vented all communication between the two collections of matter.

C A S E VIII.

Contusion with wound.

A Lunatic threw himself from a window, two stories high, and in his fall, struck his head, first against a sign-iron, and then against a slated pent-house.

He was taken up senseless, with three wounds on his head; one just above the right temple, and two on the top of his head: the wounds were but small, nor was the pericranium divided in any of them. He remained stupid above twelve hours; but being in that space of time let blood freely twice, he recovered his senses, but shewed no signs of a right understanding. He passed two days and nights in the utmost disorder and disturbance. He was confined in a strait waistcoat, and kept two people constantly employed in holding him; at last, by repeated phlebotomy, and taking a large quantity of opium, he fell asleep, slept near twelve hours, and then awoke

perfectly tranquil, and perfectly rational. By the sixth day from that of the fall, his wounds were in perfect good order, and seemed to heal without any trouble; the man was in very good health and temper, and perfectly rational and intelligent. He would have been permitted by his friends to have gone out a little way into the country; but lest there should be any latent mischief, I advised him to keep quiet a little longer, and to live with great caution; which advice was followed. On the tenth day from that of the accident, he lost his appetite, looked dull and languid, refused food and company; complained that his head ached, and said, that he had not slept. So little time had passed since he had been disordered in his mind, that, from his aspect and manner, I suspected a return of his lunacy. I let him blood again, directed that he might be kept low, and desired his brother, who was an apothecary, to give him an opiate at going to bed. The next day, the eleventh, he said that his head-ach had again prevented him from sleeping all night; and that he felt as if a cord was bound tight about his brain: his skin was too hot, his pulse

pulse was too hard and too frequent; his urine small in quantity, and high coloured; and the aspect of the wounds in the scalp, by no means so favourable as they had hitherto been: one of them looking more spongy and pale than the others, I examined with my probe, and found the skull bare for some space, under it. With his own and brother's consent, I removed all the scalp covering the bare cranium, and found it to be considerably altered from a natural colour. I bled him again, and desired that he might take freely of the salt of wormwood and lemon juice until the next day. That night he had a smart rigor; and the next morning finding him worse, and more disturbed, I made a perforation of the skull. The dura mater under this perforation was dull, and had apparently matter on its surface, though small in quantity. He was dressed lightly, and, as his pulse would very well bear it, eight ounces more of blood were drawn off. The following morning, the thirteenth, he had a still more severe shivering: his pain in his head was greater, his fever higher, and the whole sore so crude, that the lint was with difficulty removed

moved from it. I applied the trephine again, and found the same appearance, viz. a dull discoloured dura mater, and a small quantity of matter. That evening he had another rigor, and was the following day manifestly worse. Convinced, from the symptoms, of his hazard, and firmly believing that matter was collected, in such manner as not to be discharged by the two openings already made, I ventured to make a third, and that a large one; this produced an immediate and large discharge of pus. In seven or eight hours I saw him again, and found him easier and more tranquil. He had slept nearly an hour, and his pulse did not feel so rapid, nor so hard. That evening he got more sleep, and the following morning answered every question asked, in such manner, as to convince every body that he was certainly better. To shorten the relation, I shall only add, that the discharge continued large for several days, then gradually decreased: all his symptoms by degrees also disappeared, and in no great length of time, by proper care, he got very well.

When

When this patient was attacked with his first symptoms, I did not suspect the true cause. His want of sleep, his seeming anxiety, his taciturnity, and great unwillingness to answer any question, seemed to me, to bespeak a return of his maniacal disorder. Upon this supposition, I gave him the opiate; hoping, that if I could procure sleep, he might be better. But when I saw the altered appearance of the wound, and found that the pericranium had quitted its adhesion to the skull, I was no longer in doubt, that whatever else might concur to disorder him, yet all his complaints were fairly deducible from the effects of his fall. And I apprehend he owed the preservation of his life to the treatment he underwent, in consequence of such supposition.

C A S E IX.

Contusion with wounds.

A Watchman, whose stand was in White-chapel, got into a scuffle with some drunken sailors, and received several wounds and blows on his head ; from some of which he lost so much blood, that he was the next day brought into St. Bartholomew's hospital in a very weak low state.

Not one of the wounds, which were five in number, had passed the pericranium ; but his whole head was very much swollen and bruised. He was in other respects very well ; that is, he did not complain of sickness, or any other kind of pain than what foreness the bruises necessarily occasioned ; and he had the full and perfect use of his senses. As he had already sustained great loss of blood, and was more than sixty years old, I made use of no farther evacuation, but dressed his head superficially, and directed that he should be kept in bed. At the end of about a week, the general tumefaction of the head was nearly gone, and all the wounds in a healing state ; the man

trans-

transgressed rules of the hospital by staying out all night, and was discharged. On the fifteenth day from that of the accident, he came to me again, complaining of head-ach, giddiness, sickness, failure of strength, loss of appetite, and want of sleep.

All the wounds, except one, were perfectly healed; this was on the upper part of the right parietal bone; it was crude, spongy, and the exuberant flesh of such colour and consistence, as inclined me, (considering at the same time his general symptoms) to suspect mischief underneath it. I took him into the house again, and immediately removed a circular portion of the scalp, including the wound, and found both pericranium and skull in the state I suspected; that is, the former altered, and detached, and consequently the latter bare. Neither the age, habit, nor state of the man seemed to be capable of bearing free evacuation, nor did I in my own opinion believe that there was time for the experiment. I therefore perforated the middle of the bare part of the bone, and found a sufficient warrant for having so done; that is, a small quantity of matter on the surface of the dura mater. His head was dressed
lightly,

lightly, a little blood was drawn from one of his arms, and a glyster thrown up to procure a stool. The following night he passed ill; had a slight shivering, got little or no sleep, and complained very much of pain in his head; the bare membrane looked very crude, discharged a thin gleet, and pressed hard against the edges of the bone. The next day, his pulse being considerably risen, he was let blood again: that afternoon he had another rigor, and his pain as well as fever became more intense.

On the eighteenth day, finding him in every respect worse, I made another perforation, just below the former, and gave thereby a discharge to a larger quantity of matter, which the close pressure of the dura mater against the edges of the perforation had hitherto confined. On the twentieth, he was indeed rather easier, but his fever was very high, and both the dura mater and fore in the scalp looked very ill; wherefore suspecting more matter, and being satisfied the man had no other chance for life, I made a third perforation close by the second. This procured so large a discharge of pus, that I was very apprehensive that the extent of the mischief was too great for the af-

assistance of art to prove effectual in ; however, I was luckily disappointed ; for in a very few days more all his bad symptoms gradually left him, and the man got perfectly well.

From considering all the circumstances of this case, I am satisfied, that had not the cranium been perforated at all, the man must have died, from the collection and confinement of matter : and I am also as much convinced, that the two former perforations would have proved insufficient for the purpose ; and that the man owed his preservation to the large removal of bone.

This is a point of practice, which has by no means been sufficiently attended to by practitioners, nor sufficiently inculcated by the writers of our country at least. Many, who see and are convinced of the justness and propriety of it, want authority to vindicate them in proposing or executing it ; and some part of the disgrace which has been cast on the operation of the trepan has arisen from this cause. Practitioners have in general been afraid to make more than one opening, and that generally a small one. If the inflammation be of any extent, or the quantity of matter at all considerable, this one small
open-

opening must prove insufficient, either for the relief of the intense inflamed membrane, or for the evacuation of the fluid; and the only probable chance which the patient can have must be, from the removal of a large portion of bone; and this equally in the case of extravasation of blood, or serum, as in that of abscess.

C A S E X.

Contusion joined with extravasation.

A Fireman, who was at work on the top of an house, fell in with the roof of it; he was taken out senseless, and brought in that state to the hospital.

He had on different parts of his body several wounds and bruises, but none of them seemed to be of any great consequence. On his head were four, one of some size, on the upper part of the frontal bone, near to the coronal suture; two on the left parietal; one on the right side of his head, just above his ear; and a small bruise on the upper part of the os occipitis. Of all these wounds, the pericranium was divided in
one

one only, viz. that near the coronal suture.

His wounds were dressed, he was largely bled, a glyster was thrown up, and a purging mixture was ordered to be given cochleatim, until he should have a discharge per anum. The next day he was in the same state, perfectly senseless, had the apoplectic stertor, a full labouring interrupted pulse, and some difficulty of respiration. He had four or five large stools, wherefore his mixture was discontinued, but sixteen ounces more of blood were drawn from one of the jugular veins; which evacuation was repeated again in the evening of the same day, to the quantity of eight more. On the third day, being still perfectly stupid, discharging both urine and fæces involuntarily, and having still a full labouring pulse, both the temporal arteries were opened, and fourteen ounces drawn from thence. On the fourth, finding no alteration, and being satisfied that the man's state could hardly be made worse, I determined to perforate the cranium, and accordingly set a large trephine on the upper part of the frontal bone, where the pericranium had been divided. The dura mater was found to be thinly

covered with grumous blood, some of which I removed, and thereby made way for the discharge of more. The next day, (the fifth) finding that what discharge had been made, during the night, was bloody, and that the man was in no respect altered for the better, I thought I had sufficient authority for repeating the operation, which I accordingly did, close by and below the former; and as the blow, by which the wound had been afflicted, seemed to have been almost exactly on the top of his head, I made a third opening in the parietal bone, close to the future. The appearance under all was the same as under the first, viz. a thin layer of grumous, or rather coagulated blood.

Next day, (the sixth) toward evening, the man opened his eyes; and on the seventh, in the morning, he spake. The discharge of blood continued for several days; and at the end of about a week from this time, ceased; the dura mater and the wounded scalp wearing as good an aspect as could be wished, and the patient being easy, and rational.

On the eighteenth day, he complained of pain all over his head, was sick, reached to vomit,

vomit, and said that he was faint and chilly. On the nineteenth his face was flushed, his skin hot, his pulse quick, and hard. He was let blood, and ordered to have a glyster, and to take some medicines of the febrifuge kind. A day or two more passed in this manner, his fever not violent, but rather increasing than remitting; his pain, though not acute, yet such as to deprive him of his sleep; little rigors occurring irregularly, no perspiration, and an excessive languor. At last, on the twenty-first day, on the upper part of the os occipitis, on the right side where there had been a small bruise, a tumor arose, so characterized, as to satisfy me, that the cause of the late alteration of circumstances lay underneath it; it did not rise to any height, and contained a small quantity of sanies, but covered a portion of bone which the pericranium had quitted. I removed the scalp, and would have set on a trephine, but the man obstinately refused to submit to it.

On the twenty-fifth day he lost the use of his left leg and arm, and was much convulsed, in those of his right side; which paralysis and spasm continued until the

twenty-seventh, and on the twenty-eighth he died.

Upon examining his head, a collection of matter was found under the bare part of the occipital bone; the dura mater under this matter was floughy and putrid, and about a desert spoonful of matter lay between the meninges, just under the altered part of the dura mater. In the part where the bloody extravasation had been, every thing was perfectly fair and free from disease.

In this case there seems to have been as clear a distinction between the bloody extravasation, with its effects, and the inflammatory state of the dura mater, with its consequences, as can be desired. All the first symptoms were such as were caused by mere pressure of the extravasated blood; an obliteration of every sensible faculty, attended with the principal symptoms of an interrupted circulation. Perforation of the skull, where this extravasation had been made, did, by giving discharge to the blood, happily remove these, and the man was getting well apace, until the ills arising from another cause, viz. the inflammatory secession of the dura mater, in consequence

sequence of contusion, and that in another place, began to appear; they indeed made their attack rather late, nor did they rise so high as they most frequently do; but then it must be considered what discipline the poor man had undergone, and what evacuation had been made. Notwithstanding which, they bore their true, genuine, febrile, inflammatory character, and produced their most frequent event. What perforation of the os occipitale might have done, I cannot say; I fear but little, as the matter was not only upon, but underneath the dura mater, and that too diseased.

C A S E XI.

Contusion with wound.

A Drayman, drunk, and sleeping, fell from his dray, and his head was so squeezed between the wheel and a post, that a considerable portion of the scalp, together with the pericranium, was forced off from each parietal bone.

He was brought to the hospital senseless; he was largely let blood, and the separated scalp being so bruised and mangled as to afford no probability of re-union, it was removed, and the bone dressed with dry lint. The next day the man was so well, and so perfectly master of what sense he had, that I was inclined to believe, that a great deal of the last night's appearance was owing principally to liquor.

In ten days time the edges of the torn scalp were digested, and bore all the appearance of sores in a healthy man. One of the parietal bones seemed disposed to granulate without any exfoliation, the other looked as if it would throw off a scale.

On the thirteenth day he was so well, that having a large family to work for, he desired to be discharged from the hospital, and to be made an out-patient ; but his sores were still so large, and I had so often been deceived by the fallacious appearance of such cases, that I persuaded him to stay another week.

On the sixteenth day he complained much of head-ach, and said, that he was sick and chilly ; on the seventeenth, the florid, granulated appearance, and laudable matter of the sores, were exchanged for a tawny, glassy surface, and a plentiful, thin gleet. I bled him freely, and bid him keep in bed. On the same day toward evening, he had a shivering, and the day following two more ; that parietal bone (the left) which had hitherto looked as if it would be covered by a granulation, without exfoliating, now wore so diseased an aspect, that I fain would have set a trephine on it immediately, but the man would not permit me. Every other means were used, but to no purpose. The sore on the right side of the head continued to look well, but the scalp quitted its adhesion to almost the whole left

parietal bone, which bone looked very unlike to an healthy one.

On the twenty-third day, from that of the accident, he died, having been paralytic in his right leg and arm from the twenty-first.

The appearance of the two fores, as well as of the two bones, were so different, that I had curiosity to see the state of the parts underneath each. On the right side the dura mater was in a natural, sound, adherent state. On the left, it was separated from almost the whole bone, and covered plentifully by matter, and was, for about the breadth of a half crown, sloughy; under the slough the pia mater was diseased also, and matter was also formed on the surface of the brain.

The following case was brought into St. Bartholomew's hospital, while I was confined to my house by sickness. The account therefore of the patient, while living, is as taken by Mr. Earle, my apprentice; and that of the appearance after death, is in the words of the late ingenious Mr. Partridge, who assisted Mr. Earle in the examination of the body.

C A S E XII.

ON the tenth of February, 1765, John Biggs, a lad about thirteen years old, was driving a horse round in a grinding mill, the horse not being used to the work, ran round very fast; the boy fell and received such a blow from some part of the frame in which the horse worked, that he lay, deprived of sense, for some time, that is, until somebody came in to enquire why the mill went so rapid. He had a small wound on the right side of his head, and no other apparent mark of injury. In a few hours, by the assistance of phlebotomy, he seemed to be very well again. His wound was dressed by the family apothecary for a week, during which time, he did not seem to have any other complaint, except now and then having a slight head-ach. The wound, not healing kindly, the boy being a country boy, hired only for the purpose of driving the mill-horse, and the people with whom he lived being tired of keeping him unemployed, he was brought to the hospital. The wound, was not large, and although he did not seem to have any other

other complaint, was nearly three weeks in healing.

On the eighth of March, he was seized with a fever, beginning with a kind of cold fit. On the tenth, he was much disordered, complained of acute pain in his head, and his wound, which had been healed, broke out again; the pericranium separating from the bone on the twelfth, he became senseless to all outward objects, was convulsed in all his limbs, and jaw-locked. On this day Mr. Crane trepanned him, on the upper, fore and right side of the frontal bone. On the surface of the dura mater was found a considerable quantity of good matter, on the next morning he died.

The dura mater was detached from the cranium for about an inch all round the perforation of the bone; what matter had been formed on its surface had been discharged by the operation, and little or none lodged; the pia mater and brain found in this part. At about two inches distance from the original wound, higher up, and nearer both to the coronal and sagittal sutures, was a small tumor about the size of a split garden bean; within this was a very little discoloured matter, and under it the
bone

bone was bare. The dura mater corresponding with this tumor was detached, black, and sloughy, and a considerable quantity of matter lay under this sloughy part, communicating with an abscess, formed between the two hemispheres of the brain, on the right side of the falciform process.

S E C T.

S E C T. III.

Separation, or destruction, of both tables of the skull from contusion.

THE separation of a portion of the cranium, consisting of both tables, or of the whole thickness, happens not unfrequently, in old, or neglected venereal disorders. The disease, which in these cases has its seat in the diploe, often spoils the whole substance of the bone, and produces a separation, or exfoliation of its whole thickness: the dura mater being always found, in such case, to be covered only by an incarnation generated from its surface.

This kind of caries is sometimes of large extent, in one piece, but more frequently it is of smaller size,* and affects different parts of the same skull. The separated piece is generally quite carious, and appears as if it had been worm-eaten, (what the French call vermoulue). The surface of the bone so diseased, is seldom much elevated, though generally somewhat; neither
has

* I have seen in one case, nearly the whole os frontale cast off; and in another, the whole left parietal bone.

has it often the circumscribed form and appearance of a true node, as it is called; though now and then it has.

The scalp, which covers a bone in this state, is most frequently diseased also; sometimes with one, large, ill-conditioned sore; but more often with a number of crude, foul, painful, serpiginous ulcers; through most of which a probe will discover a rough, bare bone; and from which is constantly discharged, a greasy, stinking sanies. This complaint is generally accompanied by a nocturnal head-ach, pocky spots, and pains about the breast and shoulders; and is almost always preceded by the former: though very frequently that symptom ceases, either during the mercurial courses, instituted for that purpose; or when the pericranium covering the diseased part, becomes foul and sloughy.

The proportion of extent of surface, which one table of these diseased parts of the cranium bears to the diseased part of the other table, is very uncertain, and often very unequal. Sometimes the alteration of the outer table is much more extensive than that of the inner; in which case, when the separation is made, the detached piece comes away very easily,

easily, and the uncovered part of the dura mater is small, compared to the size of the external fore ; but sometimes, on the contrary, the disease occupies a more considerable extent of the inner table than of the outer, and thereby renders the case more difficult and the cure more tedious.

A mercurial course, begun, even before the scalp covering the diseased parts shall have been ulcerated, though it be often sufficient, fully and perfectly to eradicate the lues from the habit, will neither prevent, nor cure, this local malady ; which will therefore often remain, after such cause of it has been really and totally removed : the bone is thoroughly spoiled, (at least in the parts affected), and although the disease, considered abstractedly, be cured, yet the texture of these harder parts necessarily requires more time to cast off what is unsound, and to put on a healthy appearance, than the softer do ; the local distemper will remain a long time after. An inattention to, or a misunderstanding of this circumstance has been the cause, why many people have been harraressed, and even destroyed with unnecessary mercurial processes, when the complaint has been truly local, which it frequently

quently is after proper, previous mercurial treatment. Such medicines will be found to be so far from hastening the removal, that by spoiling the constitution, relaxing the solids, impoverishing and dissolving the fluids, and weakening the vis vitæ, they prevent nature from executing her own purpose, and really protract and retard that effect which they are used (though injudiciously) with design to expedite. Mercury is undoubtedly a specific for the pox, but it is also a poison. It will cure that and some other diseases; but its effects on the human frame are neither light, nor superficial. It becomes beneficial or prejudicial, according to the manner in which it is applied; and when it ceases to do good, it will most certainly do harm. This, though a very flagrant instance of it, is not the only one which might be produced: the same observation might be made, on the maladies proceeding from a diseased prostate, and urethra, producing indurations, and fistulæ in perineo; in which the persistence in the use of mercurials, after the producing lues has been cured, has cost many a man his life, by aggravating, and continuing that symptomatic hectic fever, (the necessary consequence of pain and irritation)

tation) which it should be the whole business of art to calm and attemperate. In all these cases a strong decoction of sarsaparilla, with milk, for the common drink, a soft, nutritive diet, a clear air, and the free use of the Peruvian bark, will be found to be more conducive to the patient's recovery, than any continued use of mercury. By the former he will be restored and strengthened, by the latter he will be irritated, wasted and destroyed.

The same kind of exfoliation or separation of both tables of the cranium, is sometimes the consequence of mere external violence*.

The

* Morgagni deduces this from mischief done to the
 “ vessels of the diploe. “ Antequam de Calvariæ ictibus
 “ verba facere desinamus, illud non est prætereundum,
 “ utraque ejus tabula prorsus illæsa, illæsisque subjecta-
 “ rum meningum vasis, accidere aliquando ab ictu vali-
 “ do obtusi corporis, ut vascula, quæ inter tabulas me-
 “ dullæ subserviunt, rumpantur, & sanguinem fundant;
 “ qui procedente tempore corruptus, eoque acrior factus,
 “ quod succus medullosus admisceatur, qui tum mora
 “ et calore, in pessimam degeneret rancedinem, interio-
 “ rem tabulam carie afficiat; hominique, jam ictu obli-
 “ to, & nihil ejusmodi timenti, intro defluens, meninges
 “ vitiet, necemque afferat.”

De Sedibus & Causis, &c.

The four following examples, which have fallen within my own knowledge, I shall relate without any comment.

C A S E XIII.

A Gentleman's coachman was thrown from his box, on the road between London and Richmond, and received a wound in his forehead, which divided the pericranium, and denuded the bone about an inch above the sinus. The man received no other harm in the fall; the lips of the wound were brought together by future, and he drove home.

The next day his master, who was a governor of St. Bartholomew's, and a timorous man, sent the patient into that house. As he seemed perfectly well, and the wound looked as if it would unite without any trouble, I dressed him only with a superficial pledgit. This did not succeed, and the edges, instead of uniting, became spongy. I therefore ordered him to be dressed with a little dry lint, thinking that the bare bone would soon throw off a small scale, and finish the matter. At the end of three weeks every thing was exactly in the same
 I state;

state; the bone bare, and not likely to exfoliate, and the edges spongy. Being in perfect health, the man was tired of the confinement of the hospital, and was permitted to go home, taking dressings with him.

At the end of two months from the date of the fall, he returned to the hospital again, and desired me to look at his fore; which was not only not healed, but discharged much too large a quantity of matter. The opening was about the size of a silver three-pence, round, soft, and spongy; upon feeling with a probe, I thought that the bone receded too much for a mere loose exfoliation, and as the bone receded, the discharge of matter increased. Upon repeated trials, I was thoroughly satisfied, that both these circumstances were true, and also that the loose piece was much too large to be extracted from the present opening.

I considered, that the removal of a circular piece of skin would leave a scar, which would not only be a great deformity, but a deformity which would be liable to misconstructions; and as there were no bad symptoms to be obviated, nor any thing

thing to be done, but merely to remove the loose portion of bone, I made a longitudinal incision, sufficient for its extraction, and laying hold of it with a pair of forceps, brought it away. It was the whole thickness of the cranium, in every part firm, hard, and perfectly white; and it left the dura mater covered by a florid healthy incarnation. I laid the divided scalp down upon the membrane, without any intervening dressing, and the sore healed in a few days.

C A S E XIV.

AN elderly woman riding in a hackney landau, by a sudden jolt struck her head with great violence against an iron hook, at the top of it, put there to hold the two parts of the roof together. The blow gave her exquisite pain for the instant, but that soon ceased; and as it caused neither wound nor tumefaction, she took no farther notice of it. At the end of near two months, she was seized with a violent pain in her head; so violent, that for several nights she was obliged to have recourse to

laudanum, in order to obtain a little broken rest.

In about a week her pain went off, and a tumor arose, just where she had been stricken; that is, just in the middle of the sagittal future.

Mr. Brown, of Little Britain, had the care of her; with him I saw her; we opened the tumour, and discharged a considerable quantity of discoloured and very offensive matter. I passed my finger into the opening, and to my great astonishment found it touched the dura mater. We removed a circular piece of the scalp, and found the two ossa parietalia bare, and carious for a considerable extent, on each side of the future; and in the middle of this carious piece, just in the tract of the future, a hole large enough to admit easily any man's finger, without touching the edges of the bone.

No exfoliation was found in the matter, or on the membrane; the dura mater lay at a considerable distance from the skull, in that part; the discharge from within was large and very offensive; and about three weeks, from the time of opening, she died suddenly in a kind of fit.

C A S E XV.

IN the middle of September 1763, a woman about sixty years old fell down stairs backwards; she was stunned by the blow, which her head received from one of the steps, and lay senseless some time.

There was neither wound nor considerable bruise; she was let blood, and kept quiet for some few days; at the end of which, finding no inconvenience either general or particular, she ceased to regard it.

On the eighteenth of December, she was taken into the hospital, for a swelling on the right side of her head, nearly of the size of a split Seville orange. This tumor she said, had been preceded by a severe head-ach without fever; but as she did not then believe that her fall had any share in the production of her present complaint, she said nothing about it.

Her head being shaved, the tumor appeared full of a fluid. I divided the scalp, and let out a quantity of greasy offensive matter. Upon farther examination, the bone was found to be bare, and carious. I removed such a portion of scalp,

as brought the whole into view. The natural texture of the bone was destroyed, and in it were several holes, through which a probe might easily be passed, and from which matter was discharged in such manner, and with such motion, as plainly proved, that it came from within the cavity of the skull.

She remained in the hospital until the middle of March; during which time no alteration appeared in any part of the bare bone.

The affairs of her family now required her to be at home. She was in perfect good health; was discharged from the hospital; and as she lived very near to me, one of my young gentlemen undertook to take care of her. On the twenty-eighth of March 1764, a small part of the bare bone came away, and left the dura mater covered by an healthy incarnation; and on the twelfth of April following, the whole remainder, being about a third part of the parietal bone, did the same. From first to last she had no kind of uneasiness, and the sore healed without any trouble.

C A S E XVI.

IN that ever memorable defence, made by Capt. Gilchrist, on board (as I think) the Southampton man of war, against a most shameful superiority of French force; a sailor received a severe blow on his head by a large splinter; a small wound and a considerable bruise were the immediate consequence; but they were so soon well, that the man did duty in a few days. At about seven weeks distance from the time of the accident, he began to complain of great pain in his head; which pain in a few days rendered him so incapable, that he was put into the hospital at Gosport. He remained there about three weeks, frequently but not constantly in pain; and during that time had three or four fits, like epileptic ones.

He was now sent to St. Bartholomew's hospital, and put under the care of Dr. Pitcairn, by whose order he was bled, purged, and took several medicines. The man having one day mentioned the circumstance of the blow, the doctor desired that I might examine him.

There was not the least degree of swelling or inflammation, no mark or vestige of a scar, nor any elevation of the scalp, or fluctuation of fluid under it. While I was examining his head, he had a slight attack of spasm; but on my desisting, he became easy and tranquil.

The circumstance of this attack, while I was pressing upon the part did not at that instant strike me, as worthy notice, but upon reflexion it appeared much so. The next day I made the same experiment, with the same effect; that is, upon hard pressure he became convulsed, which convulsion ceased upon removing the fingers, but was followed by a rigor. On the following day I ventured to repeat the experiment; but the man was so immediately and so terribly convulsed, that I determined never to try it again.

I informed his physician of all that had passed, and we agreed, that considering the inefficacy of all that had hitherto been done, and what had lately happened, the most probable method of attempting his relief would be, by denuding and perhaps perforating the cranium, in the place where the pressure produced so strange an effect.

The

The next day I removed a circular piece of the scalp, and found the pericranium not of a healthy or sound colour, nor adherent to the bone; which bone was carious, and had several small holes in it, through which a fanies rose and fell, according to the motion of the blood in the brain. I applied a large trephine, without any regard to the future, and removed a piece of skull. During the time of the operation, the poor man suffered greatly from spasm; but that over, he became easy and quiet.

The dura mater was detached from the skull, and had matter on its surface; which matter was extremely offensive. The ensuing night he passed ill; and the next day had such a rigor, that I verily thought it was the last trouble the man could have. The day after this I found him vastly better; the discharge from his head had been large, but he had not suffered any return either of spasm or rigor, and his principal complaint was extreme lowness.

The physician prescribed for him; his medicines agreed well with him, and every thing for several days wore a favourable aspect. On a sudden, he was seized with all
the

the symptoms of a peripneumony, and, on the third day from that seizure, died. No apparent cause of mischief was found either within or on the outside of the head, the dura mater was well incarned, and no lodgment of matter.

S E C T.

S E C T. IV.

Fissures, and fractures of the cranium, without depression.

FRactures of the cranium were, by the ancient writers, divided into many different sorts, each of which was distinguished by an appellation of Greek etymology, borrowed either from the figure of fracture, or the disposition of the broken pieces. These are to be found in most of the old books : but as they merely load the memory, without informing the understanding, or assisting the practitioner, modern authors have generally laid them aside.

This kind of injury is divisible into two general heads, viz. those in which the broken parts keep their proper level, or equality of surface, with the rest of the skull ; and those in which they do not : or, in other words, fractures without depression, and fractures with.

These two distinctions are all which are really necessary to be made, and will be found to comprehend every violent division
of

of the parts of the skull, (not made by a cutting-instrument) from the finest capillary fissure, up to the most complicated fracture: for fissures and fractures, differing from each other only in the width of the breach, or in the distance of the separated parts; and the disposition of broken pieces, in large fractures, being subject to an almost infinite variety; distinctions and appellations drawn and made from these circumstances, might be multiplied to even three times the old number, without imparting the smallest degree of useful knowledge to the man, who should be at the pains to get them by heart.

What are the symptoms of a fractured cranium? is often asked; and there is hardly any one who does not, from the authority of writers, both antient, and modern, answer, vomiting, giddiness, loss of sense, speech, and voluntary motion; bleeding at the ears, nose, and mouth, &c. This is the doctrine of Celsus, which has been most invariably copied by almost all succeeding authors, and implicitly believed by almost all readers*.

The

* “ Igitur ubi percussa est calvaria, protinus requiren-
 “ dum est, num bilem is homo vomuerit, num oculi
 “ ejus

The symptoms just mentioned do, indeed very frequently accompany a broken skull; but they are not produced by the breach made in the bone; nor do they indicate such breach to have been made. They proceed from an affection of the brain; or from injury done to some of the parts within the cranium, independant of any ill which the bones composing it may have sustained. They are occasioned by violence offered to the contents of the head in general; are quite independant of the mere breach made in the bone; and, either do, or do not accompany fracture, as such fracture may happen to be or not to be complicated with such other ills.

They are frequently produced by extravasations of blood, or serum, upon, or between the membranes of the brain; or by shocks, or concussions of its substance, in cases where the skull is perfectly intire and unhurt. On the other hand, the bones of the skull are sometimes cracked, broken, nay even depressed; and the patient suffers

none

“ ejus obcæcati sint; num per nares, auresve sanguis ei
 “ effluxerit; num conciderit; num sine sensu quasi dormiens
 “ jacuerit? &c. hæc enim non nisi osse fracto eveniunt.

none of these symptoms*. In short, as the breach made in the bone is not, nor can be, the cause of such complaints, they ought not to be attributed to it; and that for reasons, which are by no means merely speculative. For the practitioner, who supposes that such symptoms do necessarily, and certainly imply, that the cranium is fractured, must regulate his conduct by such supposition; and remove the scalp, very often without either necessity, or benefit; that is, without discovering what he looks for: and, on the other hand, if he does find the skull to be broken; believing all these complaints to be caused by, and deducible from, the fracture, he will most probably pay his whole attention to that supposed

* “ Si læsus instar dormientis sensus expers deprehendatur; si oculi ejus obcæcati fuerint; si obmutuerit; si bilem vomuerit; si animalis instar malleo icti conciderit; hæc omnia maximam & subitaneam significant cerebri commotionem, perturbationem, ac concussionem, quæ non rara integro manente, nec ulla ex parte rupto cranio, mortem percussio adferunt.” PET. PAAW.

“ Dans les playes de tête, les accidens que les auteurs anciens ont appellés primitifs parcequ’ils arrivent dans l’instant meme de la blessure, ne sont nullement des accidens, ni des signes, de la fracture subsistant, mais des accidens, & des signes, de la commotion de cerveau.”

LE DRAN.

supposed cause, and may think, that when he has done what the rules of his art prescribe for such case, he has done all that is in his power. An opinion not infrequently embraced; and which has been the destruction of many a patient: for, as on the one hand, the loss of sense, speech, and voluntary motion, as well as the hæmorrhage from the nose, ears, &c. are sometimes totally removed by, or at least disappear during the use of free and frequent evacuation, without any operation on the scalp or skull; so on the other, as these symptoms and appearances are not produced by the solution of continuity of the bone, they cannot be remedied by such chirurgic treatment, as the mere fracture may require.

If any one doubts the truth of this doctrine, I would desire him to consider the nature, as well as most generally successful method, of treating these symptoms; and at the same time, to reflect seriously, on the operation of the trepan, as practised in simple, undepressed fractures of the skull.

The sickness, giddiness, vomiting, and loss of sense and motion, can only be the
confe-

consequence of an affection of the brain, as the common sensorium. They may be produced by its having been violently shaken ; by a derangement of its medullary structure, or by unnatural pressure made by a fluid extravasated on its surface, or within its ventricles ; but never can be caused by the mere division of the bone, (considered abstractedly) which division, in a simple fracture, can neither press on nor derange the structure of the parts within the cranium.

If the solution of continuity in the bone be either produced by such a degree of violence, as hath caused a considerable disturbance in the medullary parts of the brain, or has disturbed any of the functions of the nerves going off from it ; or has occasioned a breach of any vessel, or vessels, whether sanguine or lymphatic ; and that hath been followed by an extravasation, or lodgement of fluid, the symptoms necessarily consequent, upon such derangement, or such pressure, will follow ; but they do not follow, because the bone is broken ; their causes are superadded to the fracture ; and altho' produced by the same external violence, are
yet

yet perfectly and absolutely independant of it; so much so, that, as I have already observed, they are frequently found where no fracture is.

The operation of the trepan is frequently performed in the case of simple fractures, and that very judiciously and properly; but it is not performed, because the bone is broken, or cracked: a mere fracture, or fissure of the skull, can never require perforation, or that the dura mater under it be laid bare; the reason for doing this springs from other causes than the fracture, and those really independant on it. They spring from the nature of the mischief which the parts within the cranium has sustained, and not from the accidental division of the bone. From these arise the threatening symptoms; from these all the hazard; and from these, the necessity, and vindication, of performing the operation of the trepan.

If a simple fracture of the cranium was unattended in present with any of the before-mentioned symptoms, and there was no reason for apprehending any other evil in future; that is, if the solution of continuity in the bone was the whole disease, it could not possibly indicate any other cu-

rative intention, but the general one, in all fractures, viz. union of the divided parts. But how can such union be promoted or assisted by perforation? it most certainly cannot; and yet perforation is absolutely necessary in seven cases out of ten, of simple undepressed fractures of the skull. Let us for a moment enquire why it is so. The reasons for trepanning in these cases are, first, the immediate relief of present symptoms arising from pressure of extravasated fluid; or second, the discharge of matter formed between the skull and dura mater, in consequence of inflammation; or third, the prevention of such mischief as experience has shewn may, most probably, be expected from such kind of violence offered to the last-mentioned membrane. These are the only reasons that can be given for perforating the skull, in the case of an undepressed fracture; and very good, and very justifiable reasons they are; but not drawn from the fracture.

In the first case, (that of an extravasated fluid within the cranium), the relief from perforation is not only sometimes immediate, but frequently is not attainable by any other means. This is a sufficient proof
not

not only of its utility, but of its necessity.

In the second, of formation (of matter between the skull and dura mater), it is the unicum remedium : there is no natural outlet, by which such matter can escape ; and the only chance of life is, from the operation.

In the third, that of mere fracture without depression of bone, or the appearance of such symptoms as indicate commotion, extravasation, or inflammation, it is used as a preventative, and therefore is a matter of choice, more than *immediate* necessity.

Many practitioners, both antient and modern, have therefore disused and condemned it ; and have, in cases where there have been no immediate bad symptoms, advised us to leave the fracture to nature, and not to perform the operation as a preventative, but to wait until its necessity may be indicated by such symptoms, as may both require and vindicate it. This is a point of the utmost consequence in practice ; and ought to be very maturely considered.

They who object to the early use of the trephine speak of it as being frequently unnecessary, and as rendering the patient

liable to several inconveniencies, which may arise from uncovering the dura mater, before there is any good, or at least any apparent reason for so doing. And in support of this their opinion, they alledge many instances of simple fracture, which have been long undiscovered, without being attended with any bad symptoms; and of others, which, though known and attended to from the first, have done very well, without such operation.

They who advise the immediate use of the instrument, do it upon a presumption, that, in considerable violence received by the head, such mischief is done to the dura mater, and the vessels by which it is connected to the cranium, that inflammation of the said membrane must follow; which inflammation generally produces a collection of matter, and a symptomatic fever, which most frequently baffles all our art, and ends in the destruction of the patient.

What the former assert is undoubtedly *sometimes* true. There have been several instances of undepressed fractures of the skull, which either from having been undiscovered at first, or neglected, or having been under the care of a practitioner who

has

has disliked the operation, have done very well without it. This is certainly true, but is not sufficient to found a general rule of practice upon: in matters of this sort, a few instances are by no means sufficient to establish a precedent: what has been, or may accidentally prove beneficial to a few, may be pernicious to the multitude: that which is found to be most frequently useful, is what we ought to abide by; reserving to ourselves a liberty of deviating from such general rule in particular cases.

This is one of those perplexing circumstances, which all writers lament, and all practitioners feel; but which, instead of merely complaining of, we should endeavour, as much as in us lies, to correct.

In order to obtain what information we can on this subject, we should consider, first, what the mischiefs are, which may, most probably be expected to follow, or which most frequently do follow, when perforation has been too long deferred, or totally neglected; secondly, what prejudice or inconvenience does really arise from, or is thought to be caused by the operation itself, considered abstractedly; and thirdly, what proportion the number of those who have

done well without it, bears to that of those, who may truly be said to have been lost for want of it; or of those, to whom it might have afforded some chance of relief.

With regard to the first, I have already observed in the case of simple undepressed fractures, whenever the trephine is applied, it must be with design either to relieve, or to prevent ills arising from other mischief than the mere breach in the bone; which breach, considered simply, and abstractedly, can neither cause such ills, nor be relieved by such operation. One, and that the most frequent of these mischiefs is, the inflammation, detachment, and suppuration of the dura mater, and consequently the collection of matter between it and the skull; a case of all others, attending wounds of the head, the most pressing, the most hazardous, and the least within our power to relieve. On this subject, I have expressed my sentiments so much at large, under the preceding article *contusion*, that it is needless to repeat them here. I shall therefore take the liberty of referring the reader back to that, and only remind of a circumstance well worth his attending to, viz. that there are no immediate, or early marks or symptoms,

toms, whereby he can certainly know, whether such kind of mischief is done or not; and that when such complaints come on, as indicate that such mischief has been received, although the operation is all that is in our power to do, yet it is very frequently unsuccessful*. Indeed the only probable method

* The state of the dura mater, under simple fractures and fissures of the cranium, has been very nicely observed, and very justly described, by some of the best writers of antiquity.

“ Si ad cerebri membranam usque pervenerit fractura,
 “ non rademus, sed agnoscere conabimur utrum mem-
 “ brana ab osse recesserit, an affixa permaneat. Si enim
 “ ipsa manet, inflammatio nulla infestat vulnus, & pus
 “ coctum apparet. Si cesserit membrana, augentur dolo-
 “ res, et febris similiter; os alium sumit colorem; pus
 “ tenue, & crudum effertur; & si medicus negligenter
 “ rem tractat, nec *perforatione* utitur, hoc graviora symp-
 “ tomata aboriuntur; nempe bilis vomitus, convulsio,
 “ mentis delirium, & febris acuta.”

PAULUS ÆGINETA.

“ Dico debet dari signum fracturæ, a qua removeatur
 “ panniculus grossus. In primo debes scire dispositionem
 “ syphæ; utrum est adherens, an non; videlicet, si ad-
 “ hæserit ossi non fiet in vulnus apostema calidum; &
 “ licet accidit, modicum erit; ærugo manebit de eo mo-
 “ dica; & putredo erit digesta. Sed si fuerit remotus,
 “ vehementiores erunt dolores, & febres, mutabitur color
 “ ossis, & corrumpetur, & manebit de eo putredo tenuis.”

RHAZES.

method of preventing this evil seems to be, the removal of such a part of the skull, as by being broken appears plainly to have been the part where the violence was inflicted; and which, if the dura mater becomes inflamed, and quitting its connexion suppurates, will, in all probability, cover and confine a collection of matter, for which nature has provided no outlet. This I take to be, not only the best, but the only good reason, for the *early* use of the trephine in simple undepressed fractures of the skull: and I must add, that it appears to me to be fully sufficient to vindicate and authorise it. That it frequently fails of success, is beyond all doubt; the extent and degree of the mischief being too great for it to relieve; but that it has preserved many a life, which must have been lost without it, I am as well satisfied of, as I am of any truth, which repeated experience may have taught me.

In

Si rima sit in superficie, cerebri membrana non abscedente, eadem adhibeatur, quæ ad os nudatum demonstrata est: cerebri vero membrana abscedente & humore ibi collecto, post primos curationis dies, ad terebram prope-
randum est, &c.

ORIBASII.

In matters of this sort, positive proof and conviction are not in our power; all that we can do is, by making a comparison of the conduct and event of a number of similar cases, to come as near to truth as we can, and to get probability on our side.

The second consideration which I proposed to be made was, what mischief, or inconvenience may most reasonably be supposed to follow, or to proceed from the mere operation considered abstractedly. They who are averse to the use of it, as a preventative, alledge that it occasions a great loss of time; that it is frequently quite unnecessary; and that the admission of air to the dura mater, as well as the laying of it bare, is necessarily prejudicial.

The former of these is undoubtedly true; a person whose skull has been perforated, cannot possibly be well (that is cured) in so short a space of time, as one who has not undergone such operation; supposing such person to have sustained no other injury than the mere fracture: and if the majority of the people, whose skulls are broken, were so lucky as to sustain no other injury, that is, if no other mischief was in these cases in general done to the parts contained

tained within the skull, the objection to perforation would be real, and great, and the operation a matter of more serious consideration. But this is seldom, too seldom the case; by much the larger number of those, who suffer a fracture of the skull, are injured with regard to other parts, and labour under mischief of another kind, additional to the fracture; that is, the parts within the cranium are injured as well as the cranium itself. This being the case, the loss or waste of a little time ceases to be an object of so great importance. The hazard, which it is supposed may be incurred from laying bare the dura mater, is indeed a matter of some weight, so much so, that it certainly ought not to be done, but for very good reasons; and yet, although I am clearly of this opinion, I think that I may venture to say, that let the supposed hazard be what it *may*, it cannot in the nature of things, be, by any means equal, to that which *must* be incurred by not doing it, when such operation becomes necessary. In short, if we would form a right judgment of this point, the question concerning it ought to stand thus; is the chance of ill which *may* proceed from

from merely denuding the dura mater, equal to that, of its not being so hurt by the blow, as to inflame, and suppurate? Or is the mischief which may be incurred by mere perforation of the skull, equal to the good which it may produce? These questions, let those who have seen most business of this kind, and who are therefore the best judges, consider and determine. For my own part, I have no doubt, that although by establishing it as a general rule to perforate in all cases, some few would now and then be subjected to the operation, who might have done very well without it; yet, by the same practice, many a valuable life would be preserved, which must inevitably be lost without it, there being no degree of comparison between the good to be derived from it, when used early, as a preventative, and what may be expected, if it be deferred till an inflammation of the dura mater and a symptomatic fever make it necessary.

The third consideration, viz. what proportion the number of those who have escaped without the operation, bears to that of those who have perished for want of it, is in great measure included in the two preceding;

ceding ; at least the determination of them, must also determine this.

My own opinion must, till I find reason to alter it, be the rule of my own conduct ; and though I would not by any means pretend to obtrude the former on any one, yet I think it in some measure incumbent upon me in this place to give it.

The number of cases of this kind, which are necessarily brought into a large hospital, so situated as Bartholomew's is, in the middle of a populous city, where all kinds of hazardous labour are carried on, has enabled me to make many observations on them ; and although I have now and then seen some few of them do well without the use of the trephine, yet, the much greater number, whom I have seen perish with collections of matter within the cranium, who have not been perforated, and for whom there is no other relief in art or nature, has, I must acknowledge, rendered me so very cautious and diffident, that although I will not say, that I would always and invariably perform the operation, in every case of simple fracture ; yet the case must be particularly circumstanced, the prospect

prospect much fairer than it most frequently is, and my prognostic delivered in the most guarded apprehensive manner, when I omit it. I should be sorry to be so misunderstood, as to have it supposed that I mean to say, that I think the denudation of the dura mater a matter of absolute indifference, or that no ill can proceed from it: this, I know is a point concerning which the best practitioners have differed, and concerning which, we still stand in need of information; but I think I may venture to say, what is fully to my present purpose, viz. that enlarging the opening of a fracture, by means of a trephine, will not produce or occasion much risque or hazard, additional to what must be occasioned by the fracture itself: that has already let in the air upon the membrane, and therefore that consideration is, at least in some degree, at an end, and the principal point to be determined still remains the same, viz. whether upon a supposition, that the dura mater may possibly not have been so injured as to inflame and suppurate in future, the operation ought not to be practised, as a preventative, but, on the contrary, ought rather to be deferred until worse symptoms indicate the necessity of it? or whether it ought in general to be performed

formed early, in order, if possible, to prevent and guard against very probable, as well as very terrible mischief?

I know that it may be said, that a fracture, if of any considerable size, or whose edges are fairly distant and unconnected, will of itself make some way for discharge from within; and so it certainly may, and does, in the case of an effusion of fluid blood; but even in this it very seldom proves sufficient for the purpose. But does not the distant separation of the edges imply greater separation of the attaching vessels of the dura mater? and does not experience too often prove this to be the case? In truth, the great advantage which is sometimes derived from considerable fractures, is most frequent in those cases where portions of bone are so loose as to be removable, which removal of bone stands in place of perforation, and makes much more for the necessity of the operation in other cases than against it, if properly considered.

I may possibly be told that Hildanus, Wiseman, and others of great and deserved reputation, have been of the former opinion. I know they have; and when I differ

differ from these, or any other good authority, I hope that I shall always do it with caution and diffidence ; but I hope also, that I shall never hesitate to differ from any, and every authority, when I think that I have truth on my side, and the good of mankind in my view. The above-mentioned writers, together with almost all their contemporaries, had, in simple fractures of the skull, but one object in contemplation, the extravasation of blood ; this they regarded as the cause, both of the early symptoms, and of the late ones ; considering it, as acting either by pressure or putrefaction ; and therefore, when there was no immediate sign of such extravasation, from the effects of pressure, they saw no necessity for early, or immediate perforation. But had they not forgotten the universal adhesion of the dura mater to the cranium ? had they not, without any, or indeed contrary to all authority from anatomy, formed to themselves an erroneous idea of the disposition of those parts, with regard to each other* ? Had they conceived rightly of

* Some of the writers of this time, speak of the supposed vacuity between the dura mater and skull, as being

of the consequences of an inflammation and detachment of that membrane, I am much inclined to believe, that they would have altered their opinion, and not in general have left penetrating fractures of the skull to nature; although they had, in some measure the authority of Celsus for so doing*.

Before

ing calculated for the reception of extravasated fluid, in case of accident: which opinion reminds me of that of a much later writer, who says, “that the os unguis was made so thin, for its more easy perforation in the operation of the fistula lacrymalis.”

* “In omni vero fisso fractove osse, protinus antiquiores medici, ad ferramenta veniebant quibus id exciderent. Sed multo melius est ante emplastra experiri, quæ calvariæ causa componuntur,” &c.

CELSUS.

Whoever has an inclination to amuse himself with the different opinions of different writers on the subject of perforating, or not perforating, will find them in Palfyn, Rohalt and many others.

But that the frequent ill effects of neglecting this operation were not unattended to by many, the following quotation, taken from a number of similar ones, may evince.

“Et scias, sicut volunt veteres, quod non est excusatio ab incisione, & remotione cranii, cum in eo penetrans fractura sit; & hæc propter duo; primo quod os capitis, sicut dictum est, debilem facit porum. Secundo, quia si, osse jam restaurato, acciderit interius (quantocunque mo-

“dice,

Before I enter upon the account of the present and most proper method of treating simple undepressed fractures of the skull, it may, perhaps, be not amiss to make a short inquiry into the opinions which our remote ancestors have delivered down to us on this subject, to take a cursory view of their intention and conduct, and to examine, whether the difference between their practice, and ours be well grounded or not; it being neither antiquity nor novelty, but utility only, which can demand our regard.

That extravasation of blood, and formation of matter, between the skull, and membranes of the brain, were the two principal causes, of bad symptoms, and of death, in fractures of the cranium, and that

“ dice) generatio saniei, vel alicujus humoris superflui
 “ expellendi, quomodo, jam restaurato osse, posset ex-
 “ pelli,” &c.

“ Primum notabile est istud, quod in fractura cranii
 “ debes prohibere apostema, ne accidat in cerebro aut in
 “ panniculis, &c. Tertium, notabile sit istud; quod si
 “ intentio medici solum esset, in occupatione solutionis
 “ continuitatis, vel fracturæ, stante apostemate, multa
 “ mala accidentia possent consequi, ut corruptio panni-
 “ culi, febris, apoplexia, rigor, &c.”

BERTAPAL.

that the only rational method of obtaining relief in either case was, by making such an opening in the bone as would give discharge to the said fluids, was full as well known to our ancestors as to us. Their intention and ours therefore were essentially alike, and the material difference between our conduct and theirs consists in the manner in, and the instruments by, which we endeavour to execute such intention. If the breach in the bone was small, and no symptoms of immediate extravasation attended, their principal apprehension was that the sanies, or matter, which they supposed must necessarily be excreted from the edges of the fracture, would drop down, lodge, and be collected on the surface of the dura mater.

To prevent this evil, they endeavoured to enlarge the fracture by abrasion of its edges, by means of *scalpra*, or *rugines*. These *scalpra* were many in number, and various in their size and figure, according to the opinion or whim of the practitioner. Figures of these are to be seen in many writers; in *Andreas a Cruce*, in *Scultetus*, in *Fabritius ab Aquapendente*, in
Beren-

Berengarius, &c. &c. &c. * But whoever examines them, and attends to their proposed use, will find them liable to great objection ; he will find that the use of them must be irksome to the patient, tedious to the operator, and unequal to the end proposed. That by such kind of instrument the opening of a small fracture may be enlarged, is beyond all doubt ; but if the breach be at all large, or of any length, such method of enlarging it must at best be a very operose one ; it must jarr, and shake the patient's head immoderately ; if executed unskilfully, or inattentively, it must be attended with hazard of wounding the dura mater ; and, when finished, could not properly answer the purpose for which it was designed.

Of these defects, some of the practitioners were in some measure sensible ; and therefore, if the fracture was of such size, or so circumstanced, that these *scalpra abra-*
fioria

* “ Ex fracturis vero quæ ad cerebri membranas pervenerunt, si simplex fractura sit, angustis scalpris utendum ; sin cum contusione aliqua, quod contusum est excidi debet ; idque vel terebellis prius in circuitum foratum, ac mox scalpris admotis, vel protinus ab initio cycliscis.”

GALEN.

foria would most probably prove insufficient, that is, if the accident was produced by such force, or attended with such degree of contusion, as to render it probable that the parts within were injured, they did not then depend upon this method by abrasion, but had recourse to others, by which they removed a portion of the cranium*. In the execution of this purpose also, they found themselves subject to many inconveniences, arising partly from the awkward and unmanageable form and make of their instruments, and partly from the inartificial manner in which they applied them.

Terebræ, and terebellæ, of various sorts, figures and sizes, the cycliscos, or scalper excisorius, and a variety of modioli were invented, and used for this purpose, figures of which may be seen in Vidus Vidius's comment on Hippocrates de vuln. capit. in Peter Paaw on the same; in Andreas a Cruce's officina; in Albucasis and others.

If the piece of bone intended to be removed was larger than could be comprehended

* “ In iis quæ usque ad cerebri membranam divi sunt, si sola rima sit, iisdem radulis utendum; si collisio aliqua una sit, terebris excindere collisum oportet, scalpris adhibitis.”

hended within the modiolus then in use, and which was a very defective instrument in many respects, the operation was performed by means of terebræ; which operation was still more coarse, more fatiguing, and more hazardous than that by the mere scalp. *scalpra*.

The piece intended to be taken away was surrounded with perforations, made at small distances * from each other, and then
either

* “ *Ministri juxta assideant, quorum unus caput læsi*
 “ *contineat, alter, opportuna ministeria faciat. Aurium*
 “ *foramina lana coacta obturanda sunt, ne sonitu in ex-*
 “ *cisione terreatur. His factis, infigendus calvariae est*
 “ *mucro acutus terebræ; qua læsum os colorem mutavit,*
 “ *juxta integrum; deinde lente habena terebram conver-*
 “ *tere debemus, donec inciso ossi mucro insistat; ac*
 “ *tum citatius circumagere oportet habena terebram*
 “ *convertente, donec mucro in spacium inter duplex*
 “ *os descendat; ubi autem foramen altius adactum sit*
 “ *ultra crassitudinem spacii inter duplicem testam ossis*
 “ *quod perforatur, tum terebra multo circumspectius*
 “ *convertenda est, ne repente descendens cerebri mem-*
 “ *branam violet. Cum jam terebra adacta fuerit, ut*
 “ *vel conjectura deprehendatur totam ossis crassitudinem*
 “ *esse perforatam, vel perparum solidæ sedis infra relic-*
 “ *tum, tunc is qui operatur, altitudinem degustet de-*
 “ *missa tenuis acus obtusa parte; ac si quid continuæ se-*
 “ *dis etiam reliquum sit, deprimendus altius terebræ mucro*
 “ *est, eaque lente circumacta, solidum os perforandum.*
 “ *Eadem quoque facienda sunt in aliis foraminibus, do-*
 “ *nec rima in ambitu perforata sit. Septa vero media inter*
 “ *foramina*

either the scalper exciforius or the scalprum lenticulatum was introduced, and, by means of repeated ftrokes with a heavy mallet, was driven thro' all the interftances between each perforation. By thefe means the portion of bone fo furrounded was removed, and the dura mater was laid bare. The tediousnefs which muft attend the making fo many perforations, the difturbance given to the patient's head, as well by the terebra, as by the mallet and chizel, the

“ foramina fatis habent spatii, fere quantum specilli angufti averfa pars eft. Factis foraminibus, tum ad excifionem, quæ dicitur, veniendum eft, ut excifis tum foraminibus tum mediis, læfa offa removeantur.”

ORIBASIUS.

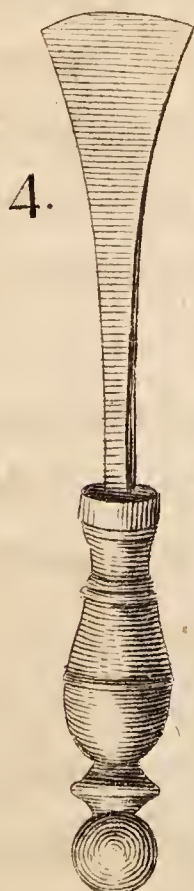
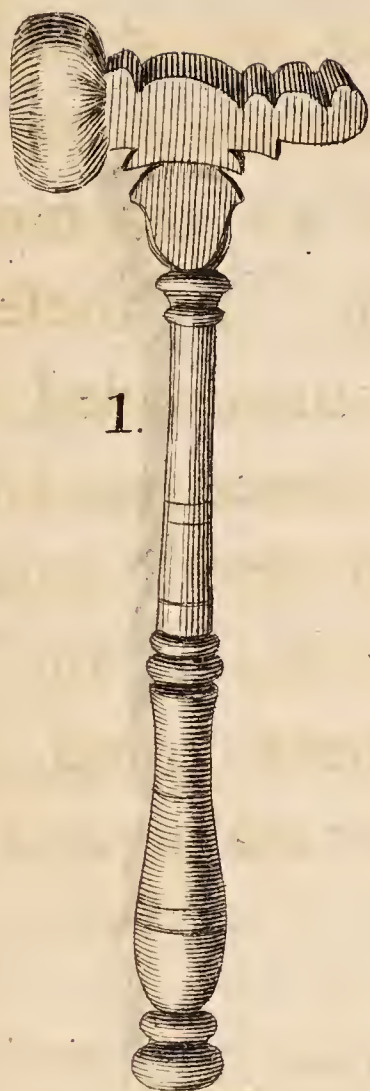
“ Modus autem perforationis eft, ut figas unum trypanorum (terebrarum) fuper os in circuitu, & revolvas ipfum intra manus tuas, donec fcias quod os terebratum eft; deinde fiat permutatio ad alium locum: & fic permutatio fiat ufque ad ultimum neceffitatis. Deinde cum alio inftrumento, quod dicitur spatumen, ab uno foramine ufque ad aliud os incidatur, &c.”

BRUNUS Chir. Mag.

“ Pone trypanum fupra os circa fciffuram, ubi vis foramen facere, & revolve ipfum intra manus tuas donec penetret; deinde muta ipfum ad alium locum, & fic fac tot foramina, quot fufficiant; deinde pone spatumen in uno foraminum, & levando manum, fuperius incidatur terminus, qui eft inter foramen & foramen, & fac fic donec feperatur os totum.”

BRUN. Chir. Parv.

To front page 150.



1. Malleus plumbeus. 2. Cyclis. 3. Meningophylax. 4. Scalper planus. 5. Scalper cavius.

Dear Sir,

I have the honor to acknowledge the receipt of your letter of the 11th inst. in relation to the above named matter. I am sorry to hear that you are not satisfied with the result of the investigation. I have been very anxious to get to the bottom of the matter, and I have been very careful to follow up every lead. I have been very busy, and I have not been able to devote as much time to this matter as I would like. I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like.

I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like. I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like. I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like. I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like. I have been very busy with other matters, and I have not been able to devote as much time to this matter as I would like.

the hazards of wounding the membranes of the brain, and the coarseness and unhandiness of the whole process, are too obvious to need a comment *. Of

* “ Quod vero per cyclifcos opus administratur, ne id quidem omnino vitio caret, quum quatiat immodice caput, quod potius quietem postulat.” GALEN.

“ At quæ per terebellam ratio quidem fungitur, parum tuta est, propterea quod dum audacius eam tractant, duram meningem non raro violant.” GALEN.

“ Sæpe scalprios pulsantes adeo ut totum cerebrum permoveatur.” GALEN.

“ Acuta terebra quamplurimas angustas perforationes, cranii fracturas ambientes, radioli crassitudine equidistantes formare solent; quod vero inter foramina residet, aut rectis, aut curvis scalprios malleolo plumbeo adactis recindere expedit. Lenticulato scalprio, adacto malleolo, id fieri potest; *horridus* tamen quidem modus est, ac in opere tardus.”

“ Scalpra hæc omnia citra malleoli operam nullius momenti sunt; moventur necessario malleolo adacto, præsertim in rimis, quæ ad diploidem usque pertingunt; excavant totum os, *forti adhibita percussione, non tuto sed incommode.*” ANDREAS a CRUCE.

“ Malleus ad percutiendum lenticulatum debet esse de plumbo, ut in parva quantitate magis ponderet.”

GUIDO.

“ Cavere oportet, ut in terebellæ admotione, ne fallaris, verum quâ parte crassissimum os esse visum fuerit, in eam semper terebellam admotam adigito.”

HIPPOCRAT.

“ Sæpe accidit, ut terebræ repente adactæ, ob naturalem perforatorum ossium debilitatem, vel tenuitatem, membranam fauciarint.” ORIBASIUS.

Of this most of them were sensible; they felt the inconveniencies, and dreaded the danger so much, as to run into great absurdities, merely to avoid them. They found that they not only wounded the dura mater, but sometimes the brain itself; and therefore had recourse to such precautions, as they thought most likely to prevent these evils. By some we are advised, not to make the perforation quite through the bone, but to endeavour to leave a thin lamina of it intire. By others, to leave the piece, which the modiolus or terebra had surrounded, adhering to the dura mater, to be cast off by its suppuration, lest the hasty detachment of it should be mischievous*.

The

* “ Quod si statim initio vulneris inflicti, curationi ad-
 “ hibearis, os ad membranam usque simul & semel ex-
 “ scindere non oportet, &c. Præterquam quod aliud
 “ subest periculum, si statim ad membranam usque au-
 “ feras, ne inter operandum membranam lædas. Sed
 “ inter secandum id observato, ut postquam eo res per-
 “ ducta, ut parum absit quin universum os pertusum
 “ sit, jamque os vacillare incipit, ab ulteriore sectione
 “ abstineas, ossique, ut sponte porro secedat, permittas.
 “ Namque ossi, quod sectum est, & sine exsectione re-
 “ lictum, nihil detrimenti accidere potest.

“ Cum itaque terebræ occurrit usus, si statim curationi
 “ adhibearis, cave sis ne ad membranam usque penetrat, ve-
 “ rum portio ossis tenuis relinquenda.” HIPPOCRAT.

The cautions laid down by Hippocrates and others, concerning the part of the bone whereon to fix the instrument, and the great attention which they admonish the operator to pay to its execution, all proceed from the same fear. For the same reason, or from the same well-grounded apprehension, it will be found that many of the best practitioners eadeavoured to furnish their perforating instruments with such guards or defences as should prevent them from going too deep *.

In

* “Terebellis autem ipsis, ut mergi non possunt supra cuspidem, nonnulli supercilium extans efficiunt.”

GALEN.

“At quia dum terebrum hoc circumagitur, periculum imminet ne membranæ lædantur, ideo nonnulli quominus aberrarent, & hoc periculi genus evitarent, terebras excogitarunt quæ mergi non possunt, & ob id a Græcis abaptista dicuntur.”

ANDREAS a CRUCE.

“Si autem os forte durum est, tunc oportet ut perfores in circuitu ejus, antequam administres incisoria cum terebris, quæ nominantur terebræ non profundantes; & non nominantur ita, nisi quoniam ipsæ non pertranseant terminum ossis, ad illud quod est post ipsum, propterea quod terebro est extremitas rotunda super illud, quod est sub capite ejus acuto, similis margini, & circulus parvus prohibet submergi & pertransire spissitudinem ossis. Et convenit tibi, ut accipias ex istis terebris numerum

“multum,

In Albucasis, in Andreas a Cruce, and many others, are figures and descriptions of modioli, duabus, tribus, vel quatuor alis muniti, of those as well as of terebellæ, called abaptistæ, mespilatæ, torculatæ, &c. the number and variety of these is very large, although they are all formed upon the same principle, and all calculated for the same purpose, viz. to perforate the skull without wounding the membrane underneath.

“ multum, quorum unum quodque conveniat quantitati
 “ spissitudinis ossis, donec præsens sit tibi omni cranio
 “ terebrum,” &c. ALBUCASIS.

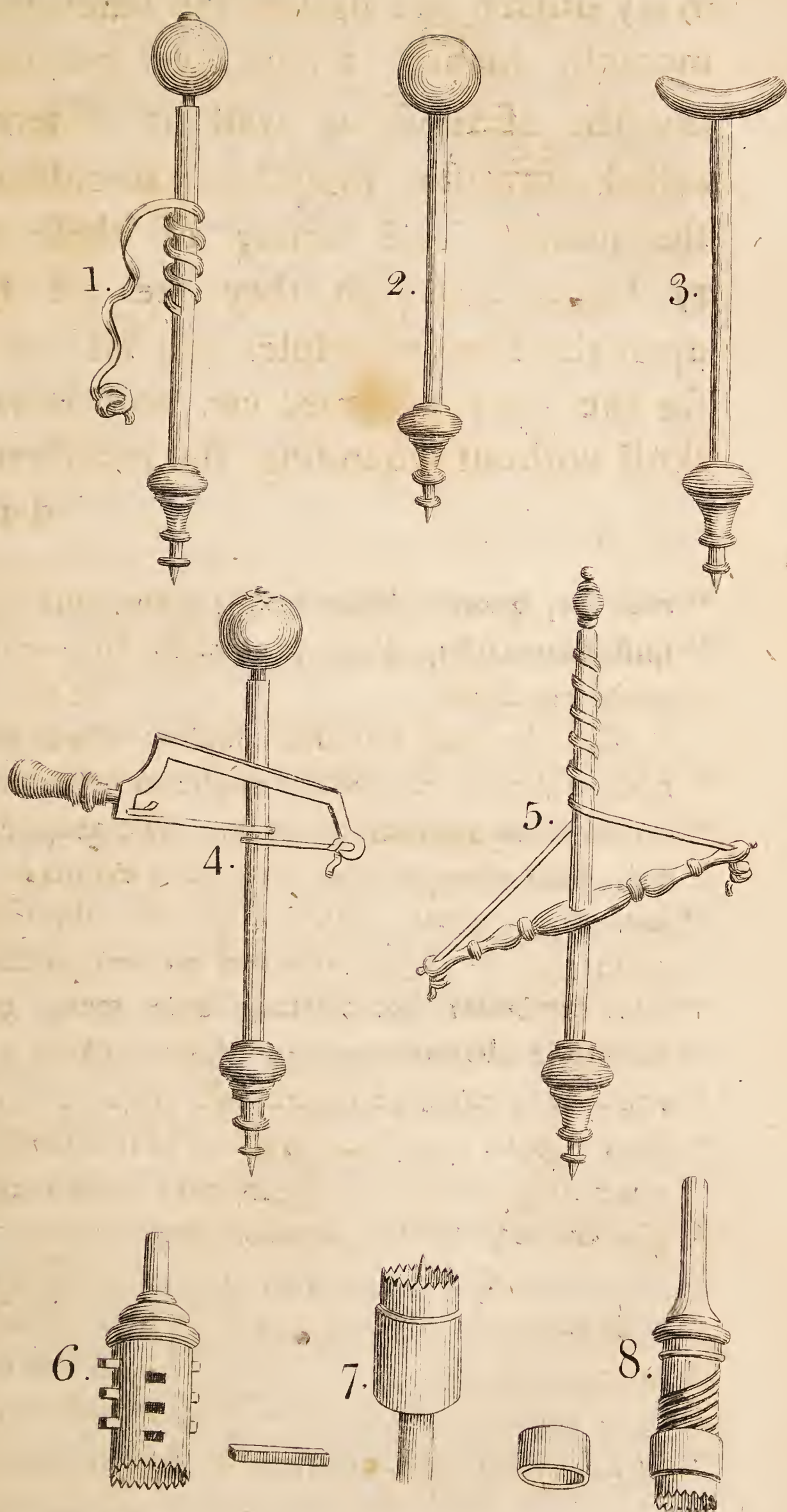
“ Modiolus fuit veteribus duplex, estque etiamnum
 “ hodie vulgaris, tum & qui duplicem habet orbem, al-
 “ terum supra alterum extantem. Hic abaptistos Græ-
 “ cis; facit namque orbis sive limbus extans ne profun-
 “ dius mergi queat. Hunc itaque describit Galenus 6.
 “ meth. cap. 6. Quidem autem quo minus aberrarent,
 “ tales terebellas excogitarunt quæ mergi nequeant,
 “ quas inde abaptista vocant. Circumcurrit enim pa-
 “ rum, supra terebellæ supercilium circulus alius parvus.
 “ Sane expedit complures id genus ad manum habere, ob
 “ quamcunque cranii crassitudinem; nam crassiori lon-
 “ gior convenit terebra, tenuiori brevior,” &c.

PET. PAAW in HIPPOCRAT.

“ Si autem validum fuerit os, prius illud terebellis abap-
 “ tistis vocatis perforatur. Ejusmodi vero sunt quæ paulo
 “ supra acumen cuspidis eminentias habent, impediētes
 “ ne ad cerebri usque membranam demergi possint.”

PAUL. ÆGINET.

To front page 154.



1.2.3.4.5. Guarded Trebræ.
6.7.8. Guarded Modioli.

derneath. But whoever will consider the very different thickness of different skulls, and of different parts of the same skull, and at the same time reflect on the extreme awkwardness of all these instruments, will immediately see, how very little dependance is to be laid on such defences, and how mischievous the use of them must very frequently have proved. In short, an attentive consideration of what our remote ancestors have delivered down to us on this subject, may satisfy us that their observations on the appearances and symptoms of the ills attending this kind of mischief, that is, fractures of the cranium, were in general extremely just and true, (perhaps, more so than those of many moderns) that their curative intention, or method of aiming at the relief or cure of such ills, was rational and just; but, that the instrumental part of their art was so deficient, so awkward, and so unhandy, that they were thereby, not only in general prevented from accomplishing the good they intended, but were not infrequently driven into almost unavoidable mischief.

Reduction of the number of instruments to be used in an operation, and an extreme
simplicity

simplicity and plainness in those which may be required, are a part of the merit of modern surgery.

The majority of the instruments, with which our ancestors perforated the cranium, were contrived to make way for the admission of other instruments; such as the scalper excisorius, the cyclifcos, the scalprum lenticulatum, &c. with which they removed a portion of bone. Even the modioli, which were used by them, were so small in the diameter of the saw, as to take away a very small piece at each application; which circumstance necessarily lessened the benefit which might be expected from the use of it, and rendered its repetition more frequently necessary than it needed to have been, if it had been made larger.

Instead therefore of that strange variety, and multiplicity of instruments, which I have already mentioned to have been used by them, we now require only a trephine of such a size as to remove a sufficient quantity of bone at once, and an elevator; or perhaps, now and then, a pair of forceps. These are all we ever can want; and these may be so made, as to be manageable by the hand of any man of common judgment,

ment, with great ease to himself, with very little fatigue and no hazard to the patient. With these we can make as large or as small an opening in the skull as we please; either for the relief of the dura mater, for the discharge of blood or matter, or for the elevation of depressed or extraction of loose pieces of bone, and that without disturbing the patient greatly, or incurring any risque of wounding the brain or its membranes *.

I have already said, that what are called the principal and diagnostic signs of a fractured

* It has been customary to make the handle of the trephine of iron, and to form the extremity of such handle in such manner, as to make it serve the purpose of an elevator; thus combining, as it were, two instruments in one. This, I think, is a great fault; such iron handle adds considerably to the weight of the instrument, and that in a wrong part of it; and thereby renders it less manageable. The handle of this instrument should be made of light wood, not too long, and of an octangular figure. Whoever will try the same instruments, thus differently made, will, I think, be immediately sensible of the preference due to the lighter handle. It is almost impossible for the handle of an instrument, whose point or extremity is to be worked with, to be too light. It is no uncommon thing to see couching needles, and instruments of like kind, laden with heavy bone handles, the inconvenience of which is too obvious to mention.

tured skull are by no means to be depended on, as indicating such mischief to exist; it can therefore be hardly necessary to observe, that what are called the uncertain signs require our regard still less. These have been mentioned by many writers, who have copied each other; such are, the holding a silk or horse-hair tight between the grinding teeth and the hand, and the making it vibrate by striking on it; the biting an hard body, and attending to the pain produced by such action, with several others of like sort; which, not to mention that they imply the patient to be sensible and intelligent, are so truly equivocal as to deserve no notice*.

All considerations also, which are drawn from the manner in which the violence was given or received, from the weight or kind of weapon or body inflicting it, from the force of the blow, the height of the fall, &c. are all equally fallacious; for every body knows that very terrible symptoms
and

* “ Item percutiatur caput cum levi bacculo sicco, de
“ falice aut de pino, & pone aurem tuam apud caput; &
“ si sanum est, tunc audies sonum sanum; si fractum aut
“ scissum, audies sonum mutum.”

and consequences are sometimes produced by accidents seemingly slight; and, on the contrary, that people often escape unhurt, from what might reasonably have been expected to have proved prejudicial to them. In short, nothing but the sight and touch are to be at all depended upon.

If the integuments are not wounded, or if the wound made in them be so small as not to admit a proper examination of the bone, and the circumstances of the case are such as render such inquiry necessary, a portion of the scalp should be removed. The manner of doing this has formerly been the occasion of much difference of opinion; but there can be no doubt about the greater propriety of removing a piece of the scalp for this purpose, by an incision in a circular form, it being that form which must afford the clearest view. If there be no wound, the point stricken should be made the center of the incision; if there be a wound, such wound should be made the center of the piece to be removed; and such piece, should always be of size sufficient to render the application of the trephine easy *. If

* It may perhaps be remarked, that through the whole
of

If the scalp be wounded, and the wound be large enough to render the fracture visible, the course of that must be the operator's direction in making his incision; and, if the skin be much torn and bruised, or spoiled, it will generally be found advisable to take away all that is spoiled at once; as the removal of it will add very little to the patient's pain, or the length of the cure, and the leaving it on, in this state, may be attended with great future inconvenience.

Scalping (as it is called) should always be executed with a knife, and that knife should be so held as to cut through the skin and pericranium, in a perpendicular manner, down to the bone at once, that the size of the bare bone may be fully equal to that of the wound in the scalp.

It is hardly necessary to insert a caution against pressing hard with the scalping knife, in the case of large fractures, attended ei-

ther
of this treatise, whenever I have occasion to speak of the operation of perforating the skull, I mention the trephine only, and take no notice of the trepan, the instrument used by most of our immediate fathers, and still in use through almost all France; my reason is, that the latter is an unmanageable one, and liable to most of the hazard and inconvenience attending the *terebræ* and *terebellæ*.

ther with great separation of the broken edges, or with loose pieces, the danger is so obvious. And it is also as obvious, that there can be but one method of avoiding such hazard, viz. by removing the scalp from, or rather making the incision in a part beyond, the fracture, and where the bone is firm and stable. By these means, not only the risque of hurting the membranes and brain will be avoided, but the whole mischief will be more fairly and clearly brought into view; a thing, which sooner or later must be done, and is always best done at first. No part of the scalp should be wantonly or unnecessarily cut away: but it should always be remembered, that this operation is, and should be performed, with intention to bring, if possible, the whole fracture into sight; and that whatever falls short of fulfilling such intention (if practicable) is wrong, not only, as it does not immediately answer the purpose for which it is intended, but it generally puts the patient under a necessity of undergoing the same pain and trouble a second time.

When the cranium is laid bare, it may not be improper to remark, that writers in general have cautioned us to beware of

mistaking either a future, or the impression of a vessel on the surface of the bone, for a fracture: I say, that they have in general cautioned us not to mistake one of these for the other, but have not informed us of the mark by which we may be enabled to make the necessary distinction, although such mark is almost constant and invariable. From the track of a fracture, or fissure, the pericranium is always found loose and detached; whereas to the arterial sulcus, and to the uninjured future, it is always adherent; besides which, the edges of a fracture will always be found rough to the probe or finger, and the sulcus always smooth; not to add, that the disposition of the future is pretty certain, and their appearance in general not extremely like to that of a fracture.

When the scalp is much bruised, or wounded, such wound or bruise points out the place from whence the piece should be removed, in order to examine the bone; and, even although no fracture should be found, is an authority and vindication of such operation, especially if the general symptoms were at all urgent; such symptoms implying mischief somewhere, and
such

such external mark rendering it clear, where the external violence causing such mischief was inflicted. But all the ancient, and many of the modern writers speak of a particular kind of fracture, in which the scalp covering it is perfectly fair and uninjured; and this they call a contra-fissure. By the general account, it is pretty clear, that the majority of those who have spoken of this kind of fracture have supposed that the breach made in the bone was most frequently in the part of the cranium diametrically opposite to that which received the blow; this the term contra-fissure implies, and this they most certainly do in general mean should be understood by it, as appears by their directing us to examine and to remove the opposite part of the scalp, if no mischief be found under the part stricken, and the patient labours under what are called the symptoms of a fractured skull.

If the symptoms of a fractured cranium were certain, and to be depended upon, this accidental circumstance, of a breach in the bone, having been now and then found in a distant, or even in the opposite part, might be an inducement to look for such mischief there, when it is not found under

the part stricken. A fracture, we might then say, there is somewhere; and it having, in some instances, been found in the opposite part of the head, it might be right to look for it there. But, as what generally pass for, and are called the symptoms of a fractured skull, are by no means to be depended upon, as indicating such complaint to exist any where, as they are producible by concussion, by extravasation, by contusion, &c. and are frequently found where the skull is entire and unhurt, they cannot be deemed a sufficient authority for removing the scalp where no apparent mark of violence is left. The smallest degree of wound or bruise will, in cases where the symptoms are urgent, vindicate the removal of scalp from such part; but where there is no local indication where to operate, I cannot see any vindicable reason for operating at all*.

The

* Morgagni, in his book de Causis & Sedibus, has very justly observed, “ that if by contrassure was meant
 “ a breach in that part of the cranium which is diametrically opposite to the part wounded or bruised, (as
 “ some have affirmed) there could be none of that difficulty which they all allow of finding, or that frequent
 “ disappointment in not finding it at all, since an inquiry into such opposite part, must always have led to the
 “ discovery.

The chirurgical intention in perforating the skull, in the case of simple undepressed fractures, is, as I have already observed, either to give immediate discharge to fluid, supposed to be extravasated between the cranium and membranes of the brain; or to obviate, and prevent such ills, as may most probably be expected to arise from the contusion causing the fracture; or to let out matter already formed in consequence of the inflammation following such contusion.

In each of these it is most probable, that the mischief, be it which it may, either is or will be seated principally under the track of the fracture; and therefore, whenever the trephine is applied for either or any of these purposes, it ought always to be set on in such manner as that the fracture should, if

“ discovery. So that instead of the term *opposite*, that of
“ *another*, part of the cranium ought to have been used.”

And then the whole of this, which has puzzled so many, will amount to no more than what every practitioner must know, which is, that we frequently find, in cases of great violence, that the skull has been broken, in a place very distant from that which received the blow, and which we are not led to the knowledge of by any apparent external mark.

if possible, traverse the circle described by the saw, or at least, so that the instrument might always comprehend the fracture within it.

I am aware that the direction given by most of the old writers on this subject is very different from what I have mentioned; but the instruments with which they operated, were so different from ours, and the advantage arising from the comprehension of the fracture within the trephine are so great, and so manifest, that I must take the liberty of inculcating a constant attention to it, as to a circumstance from which great advantages are derivable.

The saw or crown of the trephine should never be too small, especially if the patient be full grown; a circumstance which I thought it right to mention, because the instrument-makers are very apt to make them so*.

The

* The best practitioners have, at times, found themselves necessitated to apply the instrument repeatedly in the same case, in order to remove a considerable quantity of bone; and among the writers on this subject, are frequent relations of such facts. The practice is undoubtedly just and right; but I cannot help thinking, from what I have seen of the perforating instruments of
many

The number of perforations which it may be necessary to make, can only be determined by the nature of each individual case.

If the operation be performed on account of such symptoms as seem to indicate a bloody extravasation, and so free a discharge is produced by one opening, as alleviates or removes the symptoms, that one may be all that be necessary; but if the first perforation only discovers the disease, and is not followed by such discharge as relieves, or removes the symptoms, the operation ought to be repeated again and again.

If there be no symptoms of extravasation, and the instrument has been applied in a preventative sense merely, the length of the fracture must determine the number; one or two only may be made at first, and it may be right to wait for farther direction from future circumstances. The circumstances

many of our predecessors, that a part of their trouble, and of the fatigue of their patients in such cases, might have been much lessened, had the circle of their saw been larger. The advantage of a large circle is great; the inconvenience imaginary.

stances which may render a repetition of the operation necessary are, accession, or increase of fever ; large discharge of matter, or lodgment of the same fluid ; inflammatory tension of that part of the dura mater, which has already been denuded, &c. Directions to be given by a writer can, on this subject, be only and truly general ; all the rest must be left to the judgment of the surgeon, which judgment must be formed from the peculiar nature of each individual case.

When the operation has not been performed as a preventative, but to give discharge to that matter which a symptomatic fever indicates to have been formed, the quantity of such fluid, the extent of the secession of the dura mater, and the state of that membrane, must determine the conduct of the operator. The only chance of relief is, from laying bare a large portion of it, that the discharge may be as free, and the confinement as little as possible ; nothing but this can do good, the space of time in which it may prove beneficial is very short, that once elapsed is absolutely irrecoverable, and the necessary operation for obtaining such end may full as well be totally neglected, as done by halves, or too late.

The

The extent of the injured and separated dura mater, and consequently of the vacuity for the formation and lodgment of matter, is a thing of so much consequence, that it is to be wished we were able to discover it with more precision and clearness than we seem to be able to do. It is the greatest circumstance of hazard to the patient, and of direction to the surgeon. It is that which, if undiscovered or neglected, must destroy the former, and that, which when discoverable, and attended to by the latter, is not only his information, but his vindication.

The concealment of the dura mater within the cranium is one great cause of this great obscurity. This necessarily prevents us from knowing the true state of the said membrane, as much and as certainly as it is to be wished we could; but still I cannot help thinking, that there are some circumstances and appearances, as well before perforation as after, which, if carefully and duly attended to, may throw some light on this obscure part of surgery. For example, if, upon dividing the scalp, the pericranium is found to be altered, and perfectly separated from the skull to which it ought naturally to

to adhere; or if, some few days after scalp-
 ing, (as it is called) the edges of such wound
 spontaneously quit their adhesion to the bone
 all round, to some distance, and instead of
 being firm, florid, and healthy, become
 loose, tawney, and flabby; or if the skull,
 upon being denuded, is plainly of a colour
 different from that of a healthy sound bone,
 with a healthy sound membrane under it;
 or if such bone, after having been either ac-
 cidentally or designedly laid bare, undergoes
 such morbid change of aspect, and the pa-
 tient is at the same time restless and feverish,
 with tense pain in the head, and irregular-
 ly returning fits of heat and chilliness; I
 think, that we may most reasonably presume,
 that the dura mater in such patient is in-
 flamed; and that the seat of such inflamma-
 tion is under such bare and altered part of
 the skull.

This presumption, as I have just observed,
 may take place before perforation; but, if
 added to these circumstances, which appear
 before the operation, we find upon perfora-
 ting that the membrane is inflamed, detach-
 ed, altered from its natural texture and
 brightness, or smeared over with matter,
 the case is then clear, as to its nature; and
 it

it is as clear, that nothing but the removal of a considerable portion of the skull can either give room for the inflammatory tension of the membrane, or make way for the discharge of matter generated on its surface, the two circumstances on which the well-being of the patient depends, the two intentions which must be fulfilled, and which nothing but free perforation can enable us to fulfil. Whatever degree of hazard may be supposed to be incurred, by having exposed the dura mater to the air, cannot be increased by the mere comparative size of the opening; and if we may be allowed to expose our patients to any risk at all, it can only be upon a supposition, that a greater degree of good may be deducible from it.

It sometimes happens, that one of the bones of the skull is cracked, and the dura mater underneath such crack is so injured as to become inflamed, and in process of time to suppurate; but there being no early or immediate symptom of such mischief, and the scalp being neither wounded nor bruised in such manner or degree as to authorise the removal of the scalp, the true nature of the case is not known, nor the
impending

impending mischief attended to, until the symptoms of inflammation begin to appear. In this situation, after an uncertain number of days, (sometimes more, sometimes less) the patient finds himself out of order, is restless, does not get natural or quiet sleep, is flushed and chilly by turns, feels pains of the dull tense kind all over his head, but particularly in the part where the blow was inflicted. Soon after he has got into this state, the part so pained becomes in some degree tumid, the febrile symptoms advancing notwithstanding every internal assistance. If in these circumstances the tumid part of the scalp be divided, and the cranium be found bare, (the pericranium having spontaneously quitted its adhesion) whether it be broken or not, mischief is certainly forming* underneath it, and the one remedy is perforation.

It also sometimes happens, that a fine capillary fissure runs, or is continued, under

* “ *Osium rima occulta interdum non ante septimum diem, interdum non ante decimum quartum, interdum ferius se ostendit, tum caro ab osse recedit; tumque os lividum apparet; dolores item ichorum diffluentium excitantur; atque hæc difficulter remediis cedunt.*”

der an undivided part of the scalp, from the extremity of a fracture to a distance greater or less ; or, in other words, the fracture in its track, from being open and apparent, becomes capillary, and is either not seen or not attended to. If the dura mater, under such fissure, does not become inflamed, it may possibly never give any trouble ; but if it does become inflamed and suppurate, the scalp covering such fissure will, at the end of some days, swell, and become tender to the touch ; the pericranium will, by separating from the bone, form a sinus along the track of the fissure, a discharge of gleet will be made from it upon pressure, and the division of it will display the breach in the bone.

Notwithstanding the fracture from which this fissure is continued be large and open, and the trephine may also have been more than once used to such fracture, yet, when the appearances are such as I have related, if the patient be not entirely free from all general symptoms of inflammatory mischief, it may be depended upon, that the membrane under the fissure is diseased, and if a convenient opening be not made upon the part aggrieved, bad consequences will follow,

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low, notwithstanding all that may have been done to the more visible and open part of the fracture. A very strong and convincing proof of the nature of a local inflammation of the dura mater, as well as of the most proper method of treating such disorder.

In cases of great violence offered to the head, whether the skull be broken or not, it sometimes happens, more particularly in young subjects, that we find a future considerably disjoined; in which circumstance I do not remember ever to have seen one single instance of a recovery*.

I cannot take leave of this subject without reminding the young practitioner, that although it be impossible for any one, in the case of highly inflamed or suppurating dura mater, to get well without perforation of the skull, yet that operation must be considered only as one absolutely necessary part of the process toward obtaining a cure;

* “ Repentina futurarum disjunctio, si causam attendas, sine aliqua cerebri concussione esse non potest: si effectum, non sine violenta crassæ meningis, illuc magis adhærentis distractione, ac annectentium fibrillarum ac vasculorum laceratione,” &c.

cure; and that phlebotomy, gentle evacuations per anum, proper febrifuge remedies, and a strict low diet and regimen, will be full as necessary after such operation as before it. The removal of a piece of bone takes off some pressure from the tense and inflamed membrane, frees it in some degree from its confinement, and gives discharge to matter and gleet; but it does no more; and every means which can serve to appease the febrile heat, to lessen the velocity of the circulating fluids, to render the skin perspirable, and the patient cool and easy, are full as necessary after as before such operation.

C A S E

C A S E XVII.

Simple fracture.

A Principal overseer of one of the great roads near to this town was thrown down with great violence, while he was giving directions to the labourers. He fell with his forehead against a sharp stone, and lay senseless for a few minutes, but soon recovered himself and walked home. The stone had made a considerable wound, the lips of which were so torn and bruised, that the surgeon who first saw him cut them away, and by that means detected a fracture, or rather a fissure, of about an inch and half or two inches in length, on the upper or middle part of the os frontale. The man had neither sickness, giddiness, vomiting, fever, nor any other bad symptom for several days; on which account nothing was done to the fracture, which was dressed with dry lint only. He was twice let blood, and kept to a low cool regimen. At the end of seven days, he found himself so well, that he was desirous of going out; but that not being permitted, he

he stayed at home, and took great care of himself. On the eleventh day he found himself out of order, said that his head ached, that his stomach was not right, and eat no dinner. The following night he got but little rest. On the thirteenth day, having passed very unquietly the preceding night, he did not rise; and when his surgeon came to dress him, finding him feverish, he let him blood, and gave him a lenient cathartic. In the space of two days more all his symptoms were exasperated; his head-ach was great and constant, his fever high, he got no sleep at all, the edges of the wounded scalp became foul, loose, and spongy, and his forehead and visage were attacked with an inflammatory swelling of the erysipelatous kind. On the sixteenth day he had a severe rigor, and was somewhat delirious, and his eyes became so tumified that he could not open them. In this state I found him. Being informed of what I have here related, and having examined the bare cranium, I could not hesitate to say, that I apprehended his complaint proceeded from the formation and confinement of matter within the skull; and that the little chance the man had must

be from immediate perforation in the track of the fissure.

The operation was performed, and the dura mater found covered with matter. He was dressed lightly, and lost twelve ounces of blood.

The next day I was informed that he was very rational but his fever unremitting, and that he got no sleep. On the nineteenth day I saw him again, along with the late Mr. Bethune; the discharge from within the skull was large, and the bare bone and wounded scalp looked very ill; all his other symptoms much the same.

On the twenty-first I was sent for again. He was now delirious in a high degree, paralytic in one arm and leg, and frequently convulsed in the other, the discharge was large and remarkably offensive, his tongue black, the skin of his body burning hot and dry, that of his extremities cold and moist; and I suppose I need not tell the reader what happened that night,

C A S E XVIII.

A Young man playing at cudgels in Moorfields received a stroke on his forehead ; it did not seem either to himself or the spectators to have been a severe one, but as it produced blood it was deemed by the laws of the game a broken head, and he was obliged to yield to his antagonist.

As it gave him no trouble, he took no notice of it ; was for several nights afterwards engaged in the same diversion, and followed his daily labour. On the ninth day from that on which he received the blow, he thought that his forehead was somewhat swollen, and felt tender to the touch, on the eleventh it was more tumefied and more painful, and on the twelfth found himself so much out of order, that he applied to be received into St. Bartholomew's hospital.

An incision was made into the tumor ; a thin brown ichor was discharged, and a bare bone being discovered, a circular piece of the scalp was removed, which discovered a fracture. The trephine was applied twice along the track of the fracture, by which

means it was almost totally removed. The dura mater was found discoloured, and beginning to have matter on its surface. The patient was let blood, and ordered to take the sal absinth. mixture with a few grains of rhubarb in it every six hours. The succeeding night was passed ill; the patient complained much of pain, and got little or no sleep. On the fourteenth his fever was high, his skin hot, and his pulse full and hard; fourteen ounces more of blood were taken from one of the jugulars; and as he still continued costive, a lenitive purge was given a few hours afterwards. On the seventeenth every thing bore a bad aspect, both as to his wound and his general state: he got no rest, his fever was high, and the wound very ill-conditioned. His head was again carefully examined, in order if possible to discover some other injured part. No such injury was found; and it being impossible that he should remain in his present state, evacuation seemed to be his only chance, and therefore fourteen ounces more of blood were drawn from one of the temporal arteries, by which he fainted, and after which he seemed to be somewhat easier.

For three days from this time he seemed to be considerably better; but on the twenty-first he was again in as much pain as ever, and the fore again began to put on a bad aspect.

The benefit which he had once already received from phlebotomy had been manifest; and as his pulse was well able to bear it again, the temporal arteries were again opened, and he was bled till his pulse failed so much and so suddenly that I was not a little alarmed. By proper care he was brought to himself, and I had no other trouble during his cure than what proceeded from his extreme weakness, which the bark soon removed.

Although this man may very justly be said to have been saved by the frequent repetition of phlebotomy, yet as matter was beginning to be formed on the surface of the dura mater, and as such matter could have no outlet whereby to escape, it is very clear, that unless the cranium had been perforated he must have perished.

C A S E XIX.

THE driver of a post-chaise was thrown from his horse near to Ware in Hertfordshire, and struck his head against what they call a stepping-stone in a wash-way. He was stunned by the blow, and carried into a public house; but in half an hour's time found himself so well as to be able to carry the chaise to the place he was going to, which was just by. The next day, finding himself perfectly well, he went to work again, and continued to do so for six days. On the seventh, he found himself sick, vomited twice, and had a kind of fainting fit followed by a great pain in his head, and some degree of fever. From the hardship and the irregular manner of these peoples living, his complaints were supposed to be owing to cold, and to intemperance, and he was treated accordingly: but on the ninth day, a tumor appearing on that part of his head which had received the blow, a surgeon examined it, and upon opening the tumefied part found a fissure running diagonally across the whole parietal bone. The next day he was brought to St. Bartholomew's

tholomew's hospital. His skin was hot, his pulse hard and quick, and he complained that his head felt as if it was squeezed between two trenchers. The whole fissure being brought into view, the trephine was applied three times along the track of it; from each perforation, a quantity of matter was discharged, and under each the dura mater was much altered. All possible care was taken of him, but to no purpose: every day produced an exasperation of his symptoms. On the fourteenth he became paralytic on one side, and on the sixteenth sunk into a state of perfect insensibility, and toward evening died. The whole internal surface of the left parietal and temporal bones was detached from the dura mater, and covered a large quantity of matter.

C A S E XX.

A Bricklayer's labourer was knocked down by the fall of a large heavy pantile, which made a large wound in the scalp, and broke the skull. The fracture began in the left parietal bone, and traversing the coronal future ran about an inch in the os frontale.

He was soon brought to the hospital, where the scalp was immediately removed, so as to make way for the trephine; which instrument was applied on each side of the future, in such manner as to comprehend the fracture in each application of it.

The dura mater was found to be uninjured; there was neither extravasation, nor any other mark of mischief. The patient was freely and repeatedly let blood, kept to a proper regimen, and prescribed for by the physician. In two months he was discharged perfectly well, and had not during his cure one single bad symptom.

It may very reasonably be remarked, that this was one of those cases which would have done well without the operation, which I am much inclined to believe: but
does

does not this case, as well as many others of like sort, prove also, that the laying bare the uninjured dura mater is not a matter of such hazard, as some have supposed it to be?

C A S E XXI.

A Girl about nine years old fell from the top of a pretty high hay-rick at Islington, and pitched with her head on the ground, which was hard and dry. She was carried home bleeding freely from a wound on one side of the upper part of the head, and a surgeon in the neighbourhood examining her found that her skull was broken; upon which she was brought to the hospital. The fracture was detected; it began in one parietal bone, and passing the suture ended in the other, making a course of about three inches in all. It was open, and blood discharged through it.

The trephine was applied to it on each bone, the dura mater was not hurt. She had neither sickness, stupor, pain, nor fever, and got well without any trouble; not even having any exfoliation from the bare cranium.

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The same remarks as were applicable to the foregoing case are, perhaps, equally so to this.

C A S E XXII.

A Farrier's servant received a blow from the foot of a horse which he was shoeing. The blow knocked him down, and bereaved him of sense. He lived near Smithfield, and was brought to the hospital senseless.

I saw him in less than half an hour, and found him to all appearance well, his senses perfectly recovered, and no remains of the injury visible, save a small bruise on his forehead. A discutient cerate was applied to the bruise, he was let blood, a purge was ordered for the next day, and he was advised to keep very quiet.

On the third day he was perfectly well, had no general complaint, and the bruise on his forehead was what is commonly called black and blue.

He continued well until the evening of the seventh day, in which he complained of being faint, chilly, and uneasy in his head, particularly his forehead. The following

lowing night he was restless, and in the morning was sick and giddy, and had no appetite. His pulse was very little risen; however twelve ounces of blood were taken from his arm, and he was ordered to take the *sal abfinth. mixture sextis horis*, and keep in bed. The ninth and tenth days were passed in much the same manner, but on the eleventh his fever rose high, and the part of his forehead which had received the blow became swollen and tender. On the thirteenth the tumefied part palpably contained a fluid, and was therefore opened. A fracture of about two inches in length was discovered, running from just above the frontal sinus upward. The trephine was applied in the most depending part, and matter found between the membrane and bone. The day after this operation, finding his pulse to be full and hard, I bled him so freely that he swooned, and was some minutes before he recovered. That night he passed much easier; and although the discharge of matter was considerable for some time, yet, by proper care and due management, both physical and chirurgical, he got well.

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I will not assert it to be a general fact, but as far as my own experience and observation go, I think that I have seen more patients get well, whose injuries have been in or under the frontal bone, than any other bones of the cranium. If this should be found to be generally true, may not the reason be worth enquiring into?

C A S E XXIII.

A Lad about seventeen, the son of a plasterer, was at work with his father at the mansion-house, and fell from a scaffold a considerable height. He lay senseless for some minutes, but in a little time was so much recovered as to walk. On the left side of his head was a small bruise, which gave him little or no pain. He had no symptoms which indicated that he had sustained any mischief; and after having staid at home a day or two at the persuasion of his mother, he returned to his business. On the ninth day, from that of his fall he was seized with a violent shooting pain in his head, was sick, and had a kind of convulsive fit.

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As it was not supposed that his fall had any share in that attack, no notice was taken of it; a few ounces of blood were drawn from his arm, and the apothecary who had the care of him gave him some of those medicines that are called nervous.

His head-ach, fever, and watching, continued without remission for several days, and at the end of three weeks he died, paralytic on one side, and convulsed on the other.

A small swelling having appeared on his head three or four days before his death, his father desired me to come and look at it, after that event had happened.

The pericranium was separated from the left parietal bone quite across, by means of a fracture which traversed the length of the whole bone. A quantity of matter was lodged between the inner surface of the said bone and the outer one of the dura mater, and a smaller collection of matter was also found between that membrane and the pia mater.

C A S E XXIV.

A Young man about twenty-two was brought into St. Bartholomew's hospital, considerably hurt by a fall from a high scaffold.

The radius of his right arm was broken about its middle; the tibia and fibula of his left leg were both broken, and one or two of his ribs.

By proper care, in about five weeks, he was so well as to be permitted to get out of bed. The first day of his rising he complained of being sick and giddy, which was imputed to weakness and confinement, and therefore disregarded. For three or four days after this period he complained of constant pain in his head, got no sleep, and was constantly feverish. As he had never made any complaint of his head, nor had apparently sustained any injury on that part, Mr. Nourse (whose patient he was) could not suspect any, and therefore contented himself with the common antiphlogistic regimen. At the end of the sixth week, he complained that his head was painful to the touch; and the day after he had made this complaint, he
had

had a severe rigor, which lasted half an hour. On the twenty-ninth day a swelling, palpably containing a fluid, appeared on the side of his head. Mr. Nourse opened it, and found a fracture of the parietal bone three inches long at least, through which matter issued freely. The trephine was applied, a large quantity of matter was discharged, and the dura mater was found sloughy; under which sloughy part was another collection of matter between the membranes, and under this latter abscess the brain was considerably discoloured. He died on the fiftieth day from that of his fall.

C A S E XXV.

A B O Y, belonging to a horse-dealer in Smithfield was thrown from a horse, with great violence, against one of the sheep-pens. He had a large wound and a fracture, which began about the middle of the frontal bone; and passing the coronal suture, ended in the right parietal.

A trephine was set on the fracture in the frontal bone, and a small quantity of grumous blood discharged from between the
cranium

cranium and dura mater. All that day and night he continued senseless ; but the next day, by means of a second plentiful bleeding, he recovered his senses. To render every thing (as I hoped) secure, a small trephine was applied on the other side of the future, which seemed to comprehend all the breach made in the parietal bone.

For nine days from this time every thing looked well, and the boy was free from complaint ; but on the twelfth from the accident, he complained of being much out of order ; and the next day the sore looked ill, and a thin gleet was discharged from the dura mater through the lint, which now stuck fast to it, instead of coming off easily as usual, and covered with good matter.

For three days from this time, both the boy and sore remained in much the same state. On the seventeenth, in dressing him, I observed a spongy kind of papilla on one part of the sore, which was very tender to the touch, and from which was discharged upon pressure, a thin sanious kind of fluid ; by means of a probe passed through this papilla, I discovered a sinus with bare bone its whole length : the division of this de-
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ected a capillary fissure, of at least two inches in length. A trephine was set on it, and the dura mater was found discoloured, and with matter on its surface. By means of free evacuation at first, and as free use of the bark afterwards, this patient got well.

C A S E XXVI.

TWO female inhabitants of St. Giles's got drunk together, and quarrelled; one of them threw a stool at the other, and knocked her down. The edge of the stool cut through the scalp, and broke the left parietal bone. The fracture ran from the middle of the bone as far as the sagittal suture. The girl was dressed that night by somebody in her neighbourhood, and was brought the next morning to the hospital. As she had no bad symptom of any kind, the operation was deferred, and she went on very well for a week, at the end of which time she began to complain in such manner, and her face bore such an aspect, that I thought there must be mischief under the cranium. A trephine was set on the fracture; the dura mater was found sloughy
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and purulent. She was bled again freely, and took proper medicines. On the fifteenth day she had a shivering, and after it a very brisk fever. On the seventeenth she was worse in every respect. On the eighteenth a tumor appeared on the other side of the head. This was opened, and a fissure discovered in the right os parietale. A trephine was set on this fissure, and a discharge given to a large quantity of matter. Every thing that could be done for her was done; but on the twenty-third day she died.

The dura mater was separated from both the parietal bones, and matter found in large quantity under each.

It was for many years a generally received opinion, that one use of the futures of the cranium was, to prevent the passage of a fracture from one of the bones to another.

This purpose they may undoubtedly have often accidentally served; but that they are generally incapable of so doing, manifold experiences evinces. Fractures are often seen to pass regularly through a future, from one bone to the adjoining, without any discontinuation or impediment. This is a fact which

which ought, by writers and lecturers, to be constantly inculcated, as an inattention to it may be of very bad consequence to individuals: for the practitioner who supposes that a future will certainly, or not unfrequently, set bounds to a fracture, will, when he has traced such kind of breach in one bone as far as the future into which it may happen to run, not think it at all necessary to go farther and examine the adjoining bone.

A suspicion of the stricter adhesion of the dura mater to the skull at the places of these futures than every where else, the situation of what are called sinuses immediately under the futures, and a fear that either high and dangerous inflammation must follow the violent detachment of a part of them, or that an unrestrainable and fatal hæmorrhage must ensue from a breach of those vessels which pass from the sinuses through the futures, have deterred most of our ancestors from meddling with them, and induced them to deliver down to us frequent prohibitions against the application of perforating instruments upon them. Neither of these apprehensions are founded in fact, or in strict truth. The separation of the skull from the longitudinal sinus is not attended [necessarily with any

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kind,

kind or degree of inflammation peculiar to itself, or more than any other part of the dura mater; nor is the laceration, or breach of the communicating vessels between this sinus and the future which covers it, necessarily followed by any such degree of hæmorrhage as to prove hazardous or alarming; as I have more than once experienced.

A perforating instrument most certainly ought not wantonly or unnecessarily to be set on this part; and this for a reason not drawn from any peculiar hazard attending such operation. The larger size, and greater number of vessels here than in other parts of the bone, will certainly cause such a degree of bleeding or hæmorrhage, as though easily restrainable when the piece of bone is removed, may yet, in the act of perforation, considerably embarrass and perplex a young operator: it will therefore behove him, in general, to avoid comprehending the future within his saw; but still it is right that he should know, that when particular circumstances render it absolutely necessary, such thing may be done very consistently with his patient's safety. Not only a part of the sagittal future, covering the longitudinal sinus, may be removed with a trephine, if
necessary,

necessary, and no hazard be incurred from the breach of the attaching vessels ; but a wound of the sinus itself is by no means *necessarily* attended with an unrestrainable or fatal hæmorrhage.

The very writers themselves, who are so apprehensive of a wound of this part, forget the relations they every now and then give us of fragments of broken bone safely extracted from it.

A mistake concerning the nature of the sinuses was (I suppose) the foundation of these apprehensions. The idea which most of our ancestors had of the motion of the dura mater induced them to believe that, as the sinuses were composed of this membrane, a wound made in them, like a wound in an arterial tube, could hardly reunite. It is now universally known, that they are merely venal, and that there is no such impediment to the immediate coalescence of a wound in them, when it may happen to be accidentally inflicted.

C A S E XXVII.

A BOY about eight years old, the son of a Jew merchant in the city, received a blow on his head with a stick from his tutor. The stroke made him giddy for a few minutes ; but as no blood was shed, and the pain soon ceased, he concealed it till it was discovered by his barber that his head was swollen in that part. In the middle of the top of his head was a tumor, about the size of a common wall-nut ; it was indolent, had a dull kind of pulsation, and palpably contained a fluid.

Mr. Serjeant Amyand and Mr. Shipton were joined with me. In their presence I divided the tumor with a knife, and let out a quantity of fluid venal blood. When as much had been discharged as the tumor might be supposed to have contained, we were surprized to find the blood still continue to flow, plainly not from the wounded scalp but from the bottom of the cavity.

Upon examination, it was found that the sagittal future was broken, that a portion
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of the fracture was forced into the sinus, and that the blood issued by the sides of this fragment.

Extraction of this fragment was attempted, but to no purpose. By the direction of the consultants, I made a small perforation on one side of the future; but when that was done, the point of the elevator could not be so introduced as to get the broken piece out. The trephine was then applied on the other side of the future, and to the same effect, or rather no effect. The fragment was only capable of being extracted as it had gone in. At last, after much deliberation and conversation about the hazard of wounding a sinus, (which was indeed already wounded by the broken bone) it was agreed to set a trephine on the future, in such manner that the whole surface should be comprehended within its circle. This was done; but when the elevator was applied, the piece sawed came out in fragments, and left the one portion which had pierced the sinus still sticking in it. We were then necessitated to lay hold of it and extract it with a pair of forceps. A flux of blood followed, but by the application of a small doffel of dry lint,

held on for a few minutes, it ceased, and never recurred. The patient is alive at the time of my writing this.

C A S E XXVIII.

A Girl about sixteen was knocked down by her mother with an iron poker of considerable weight; the latter immediately ran away, and the former was brought senseless to the hospital. She had a large wound on the top of her head, with considerable fracture of the sagittal suture. The broken pieces were so large, and so loose, as to be easily removable without any perforation. When they were taken away, the longitudinal sinus was left bare, at least two inches in length; but no hæmorrhage followed the removal of the fragments.

For three days she was bled twice a day, from one part or other of her, and stools were procured in such manner as was possible, but to no purpose; she still remained perfectly and absolutely senseless. On the fifth day, finding her still in the same state, and verily believing that nothing in art could at all serve her, I made an opening with a lancet into the longitudinal sinus,

and

and suffered the blood to run off, until her countenance, which was much flushed, became pale, and her pulse, which till now had been full and strong though labouring, faltered considerably; in short, till she shewed as much as a senseless person could the marks of a deliquium from inanition. I then put a bit of lint on the orifice, and ordered the nurse to keep her finger lightly on it until I had visited the rest of the house. When I returned, the part shewed no disposition to bleed again, nor did it ever after. That afternoon she opened her eyes and moved her arms, and the next morning was sensible enough to ask for drink. She retained her senses for several days, but a fever coming on she became delirious and convulsed, and died so on the seventeenth day from that of her admission into the hospital.

Upon examination, after death, a considerable abscess was found on the surface of the brain, on one side of the falciform process of the dura mater.

I should be very sorry to be so misunderstood, as to have it conceived that I have related these cases with a view to encourage the opening the longitudinal sinus;
that

that is far from my intention ; I only mean, by adducing these instances, to prove that our fears of irremediable mischief from such wounds, whether accidentally or artificially inflicted, are not well grounded ; and that we may, in some desperate cases, have recourse to such means as have been supposed to be either impracticable or unwarrantable. A surgeon should ever be cautious, but ill-grounded apprehensions will necessarily prevent improvements, and hinder us in some cases from attempting what may prove beneficial to mankind. Had every successor to Hippocrates been of his opinion, the operation of lithotomy had never arrived at its present state of perfection, and mankind had been suffered to languish under, and be destroyed by, a most tedious as well as excruciating malady.

S E C T. V.

Fractures of the cranium with depression.

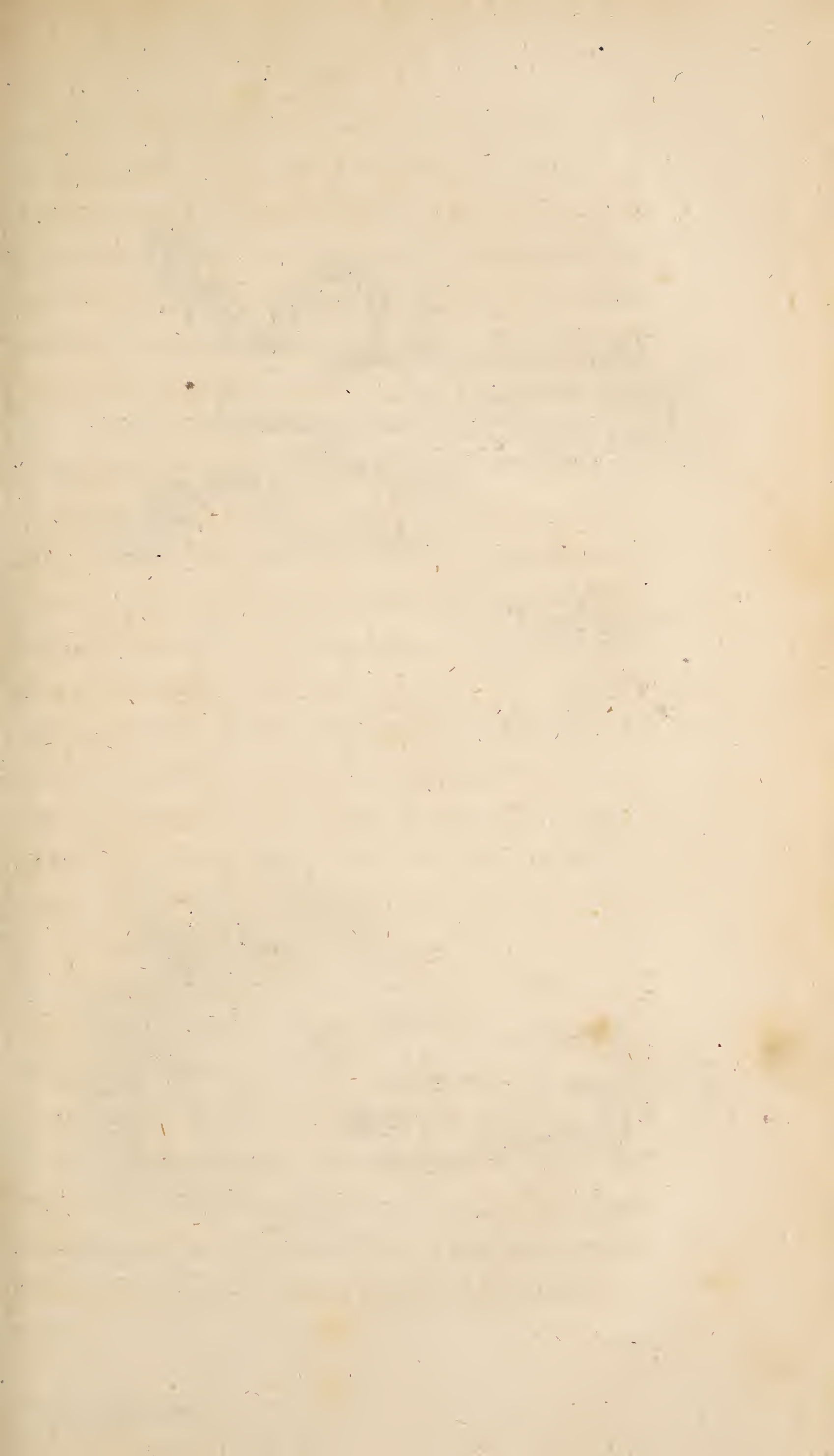
SIMPLE fractures of the skull, or those in which the parts of the broken bone are not depressed from their situation, differ from what are called fissures, only in the distance of the edges of the breach from each other. When the separation is considerable it is called a fracture, when it is very fine and small it is called a fissure. The chirurgical intention and requisite treatment is the same in each, viz. to procure a discharge for any fluid which may be extravasated in present, and to guard against the formation or confinement of matter in future. But in fractures attended with depression the intentions are more. In these the depressed parts are to be elevated, and such as are so separated as to be incapable of re-union, or of being brought to lie properly and without pressing on the brain, are to be totally removed.

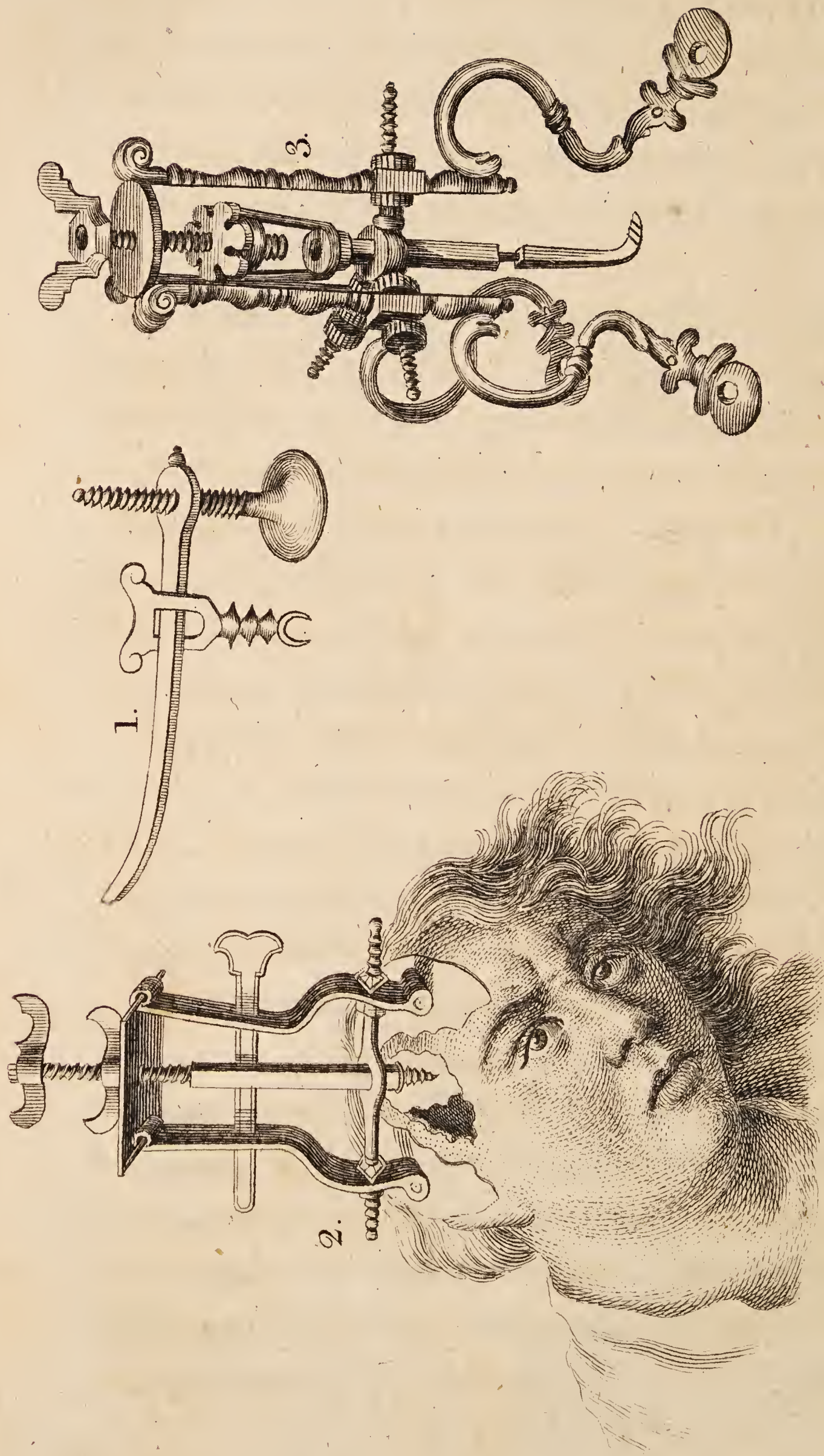
These circumstances are peculiar to a depressed fracture ; but although they are peculiar, they must not be considered as sole, but

but as additional to all those which have been mentioned at large under the head of simple fracture: commotion, extravasation, inflammation, suppuration, and every ill which can attend on or be found in the latter, are to be met with in the former, and will require the same method of treatment.

To free the brain from pressure, and to provide a free discharge for blood or lymph at present, or for matter in future, by elevating the depressed pieces, and by removing such as were loose, was as well known to the ancients to be the proper curative intentions, as they can be to us; but the means which they made use of in order to accomplish these ends were somewhat different to what are now used, and laboured under some inconveniences which later practitioners have corrected. This difference it may be worth while to inquire into.

Most of the attempts made by our ancestors, for the elevation of depressed parts of the cranium, were made by the application of instruments to the parts so depressed. This was a palpable imperfection, to say no more of it; but this was not all; for the instruments which they made use of on these occa-





1. Elevatorium simplex. 2. Trochlea typas. 3. Trochlea typas of the Antient.

occasions were not only to be fastened to the depressed part of the bone, but required also some degree of force to be used in fastening them to such part. The troclea tripes, the troclea bipes, and all the pieces of machinery designed by Albucasis, Guido, Andreas a Cruce, Fabritius ab Aquapendente, Paré, and Scultetus, as well as those delineated by Hildanus, and Peter Paaw, are proofs of this: they all require a perforation to be made in the depressed piece, either by or for the screw with which it is to be elevated. Now, not to mention that most of these instruments were so complex as to render them extremely awkward and unmanageable, it is obvious, that by the application of any of them to the depressed pieces, (especially if they were loose) all the ills arising from pressure made on the parts underneath must be increased; and that in many cases they could not be used at all. Celsus has indeed directed the meningo-phylax to be used as an elevator; which instrument differs but little from the elevator used at present, either in form or manner of application; but then the opening through which it is to be introduced, is to be made either with the terebra or
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the cyclifcos, the inconveniences of which have already been remarked. In short, all the objections which the old perforating instruments were liable to in simple undepressed fractures being of still greater force in fractures with depression, and the application of any kind of instrument whatever to the outer surface of a depressed or loose piece of skull being palpably wrong, and liable to hazard, the present practitioners are certainly vindicable in having laid them all aside, and in having endeavoured to accomplish the same end by means which are less hazardous and less operose. The trephine is (as I have before observed) the only perforating instrument used by the best of the present practitioners in England; with this, an opening is made in the sound undepressed part of the cranium, and thro' such opening an instrument called from its use an elevator is introduced. This perforation should either comprehend the border of the fracture, where that is possible, or if that cannot conveniently be done, should be made as near to it as possible, for reasons too obvious to need recital. What number of perforations may be necessary can only be determined by the particular cir-

circumstances of each individual case ; all the intentions which may arise from extravasation of fluid, or probability of suppuration, as well as those from the depression of bone, must be fulfilled, or the work will be left imperfect, and little chance of good will attend it.

When the whole disease seems to consist in the mere depression of the bone, and what symptoms attend seem to proceed from that alone ; the elevation of such portion may procure immediate remission of such symptoms, and afford a reasonable prospect of success. But as the injury is not always of so simple a nature, as other parts are so frequently hurt and other mischief done by such great violence, the remission, or disappearance of such symptoms as arise merely from such pressure, cannot be a sufficient warrant, either for promising or for expecting success. The dura mater under the depressed piece, or even in another part of the head, may have been so hurt as to become inflamed, and to suppurate, the symptoms of which will not appear immediately, nor in general until some time is past ; but however late they may come on, they will not therefore be
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the less certain or the less hazardous. The early attack of those which are caused by extravasated fluid, or depressed bone, do by no means preclude the later accession of such as arise from inflammation and putrefaction. The depressed piece of bone does most certainly require our immediate help, but the assistance lent to that, however proper and effectual, does not render it at all less necessary to guard against such ill as may most reasonably be expected to proceed from violence sustained by the parts underneath. A blow, which has been sufficient to break and depress a portion of the skull, very frequently does such damage to the tender vessels which communicate between that bone and the meninges, as to be the cause of much more, as well as greater ill, than what is deducible from the mere fracture; and, consequently, although the elevation of the bone is *one* very necessary part of the surgeon's business in these cases, yet it is very far from being *all* that he has to do. All the ills which may be apprehended, from every other possible effect of such violences, are to be feared and guarded against, and that full as much in the fracture with depression, as in that without.

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This is a part of practice which ought to be very carefully attended to. The generality of writers have contented themselves with directing us to raise up the depressed parts, and thereby to endeavour to remove such symptoms as are caused by the mere pressure which the bone makes on the brain ; but have either totally neglected, or very slightly passed over, what is of full as much consequence to the patient ; I mean the injury which is most frequently done to the membranes of the brain, and which, if neglected, will certainly produce that fever, and those symptoms, which so often baffle the whole power of medicine.

The combination of different ill effects, proceeding from the same primary violence, and concurring in the same subject, together with the great difficulty of distinguishing them from each other, is one of the principal causes of that perplexing uncertainty attending wounds of the head. When one cause of bad symptoms has been removed, another, or even several others, may still remain, each of which singly may be sufficient to destroy the patient ; and therefore although the means first made use of may have been such as have been

pointed out by the earliest and most alarming symptoms, and extremely proper for the relief of such complaint, had it been the only one the patient laboured under, yet in the case of a complication, by not being sufficient to answer every requisite intention, they very often answer none ; at least not effectually ; and producing only a temporary and partial relief, prove a greater aggravation of our disappointment.

This every practitioner should know, and this the friend of every patient should be made acquainted with, lest the former, being deceived by an appearance of amendment, be induced to promise what it will not be in his power to perform ; and the latter, having had their hopes exalted, should be the more severely hurt by their disappointment.

If the fracture be but small, the depression little, and the force with which it was produced not great, the elevator introduced through the perforation may be sufficient to set it to rights, and, if there be no urgent symptoms nor any mischief done to the internal parts, may be sufficient for all purposes. But if the force was great, if the symptoms are immediate and pressing, if the

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the fracture runs in a form inclined to a circular one, or if the depressed piece be cracked all round, the best and safest way is to remove the whole or greater part of the portion so depressed and circumscribed.

To those who are unused to things of this sort, so large an opening as such method of acting must make will have a very tremendous appearance; and they may be inclined to suspect much hazard and inconvenience from laying bare so large a portion of the dura mater; but let all such remember, that however large the quantity of membrane may be which shall be thus denuded by the operation, yet the same quantity at least, most probably a much larger, would, in all likelihood, become inflamed, and generate matter on its surface; which matter, for want of a timely, ready, and sufficient outlet, would do considerably more mischief, than the mere detection of the said membrane can do.

In cases where the broken pieces of a depressed fracture are widely separated from each other, and some of them a good deal loosened, the expediency and the propriety of removing such pieces is acknowledged by every body; but few people attend to the

reason, or inquire why such practice is just and proper; if they did, they would also see that the free removal of bone was equally proper in the case of great violence, as in that of loosened or widely separated pieces. In the latter, the broken parts are removed, because their re-union with the rest of the cranium, and the preservation of the attachment of the dura mater to the inner surface of them, is thought impossible, or at least highly improbable; and that therefore they must be in the way, and hinder the free discharge of matter from the suppurating membrane: and is not the same inconvenience full as likely to attend the former? Is it the violence done to the bone, and through it to the membrane, which causes the inflammation and suppuration? or is it the loosened or separated state of the broken part? If it be the former, (as it most undoubtedly must be) the same precautions, the same method of treatment must be equally necessary in the one as in the other; the reasons, the intentions are the same in each, and if the conduct be not the same the patient will suffer.

The peculiar circumstances of each individual case must furnish direction to the practitioner for his particular conduct. Rules to be laid down by a writer on such subject can be only general. The parts which are depressed must be elevated, such as are loose and cannot be brought to lie even, such as cannot be prevented from pressing on the membrane, or such as wound or irritate it, must at all events be taken away; the free discharge of blood or lymph, in present, and of matter in future, must be provided for, and therefore every symptom and appearance must carefully and early be attended to, lest the most proper opportunity of giving assistance be not embraced.

The circumstances just mentioned are such as cannot be neglected but at the risque of the patient, and therefore the prohibitions which our forefathers have delivered down to us, with regard to the parts of the skull, on which they say we ought not at any rate to apply our perforating instruments, must be received with some limitation.

The places forbidden as improper are, the futures, the lower part of the os occipitale, the ossa temporum, and that part of

the os frontale where the sinuses are situated.

That a trephine may without hazard be applied on a future, I have already said. When it may with equal utility be set on any other part, the futures should undoubtedly be avoided, and that for a good reason, exclusive of any peculiar hazard: but that part of a future may (the case requiring it) be safely removed, is true beyond all doubt. That many of the old practitioners were very apprehensive of mischief from hence, is not to be wondered at by any body who considers their idea of the nature of the subjacent sinuses, and the strange unmanageable instruments with which they operated. Not that there are wanting old writers who have held the doctrine of operating on a future, when necessary, very defensible, among whom is J. Baptist. Cortesius.

Perforation of the temporal bones has been forbid, both on account of the artery and the muscle which are on its surface, unrestrainable hæmorrhage having been dreaded from the one, and fatal convulsion from the other; but experience may convince us, that neither of these apprehensions are strictly just. The temporal artery, when
divided,

divided, is often capable of being restrained by compression, and always by ligature; and that fatal convulsion, which is vulgarly called the locked jaw, though it produces one of its most striking and most visible effects on these muscles, is not necessarily produced by a wound of either of them, more than by a wound of any other. In short, the upper part of the temporal bones may be laid bare, if necessary, by an incision made through the muscles covering them; and may also be perforated. Such operation does not indeed often prove successful; but the failure of success does not proceed from the nature of the parts operated upon, but from a circumstance of much more consequence, and generally without remedy; which is, that in these fractures the breach is most commonly continued on to the basis of the skull, and is also most frequently attended by a large extravasation within or under the brain and cerebellum.*

When

* Whoever will examine the disposition of the temporal muscle will see, that its aponeurosis covers a very considerable part of the inferior border of the os parietale;

When the depressed parts have been raised up, the loose ones removed, extravasated fluid discharged, the brain freed from pressure, and way made for the free exit of whatever may be formed or collected, the bare dura mater should be dressed as easily and lightly as possible. Our ancestors had a multiplicity of medicaments, which they used upon these occasions, and were very precise in suiting them to the different states (as they called them) of the fore and membrane. They were also very exact in making and applying those pieces of linen or of silk, called bindons, which they used to imbue with the said remedies, and dress the bare dura mater with. I have taken no notice of either, because I verily believe that the majority of the former were absolutely useless, and that the very exact application of the latter was prejudicial, by confining, in some degree, what ought to be discharged with the utmost freedom.

Wounds of the brain, among writers on this subject, have also generally made a distinct

and consequently, that such part of the bone can never be laid bare without a division or removal of a part of the said aponeurotic expansion.

ting chapter ; but the treatment of them is so very little different from those which have been already related, that they may fairly be comprehended under the same article.

The brain is wounded either by the instrument or body whereby the skull is broken, or by broken parts of the cranium ; foreign bodies also, such as bullets, splinters, parts of weapons, wadding of firearms, &c. are sometimes lodged in it ; but let the wound or fracture be what it may ; or whatever other circumstances may happen to attend, the chirurgic treatment is short and plain, viz. to remove all such parts of the broken skull, as may press, wound, or irritate the brain, or its membranes ; to take away all such extraneous bodies, as can easily, and without violence be got at and extracted ; and to make such an opening, as may most conveniently serve the purpose of discharging blood, serum or matter, either in present or in future. When all these things have been done, and the patient has been put under a proper regimen, both of diet and medicine, the surgeon has done his duty, and may say with Mr. Pope,

“ Thus

“ Thus far was right; the rest we leave
 “ to heaven.”

For with regard to the dressings proper in these cases, they are not at all different from those which ought to be used, where neither the brain nor its meninges are hurt. They should be soft, light, and not consist of any thing greasy, or which can possibly irritate or inflame; nor should they be applied in such manner or quantity as to press or obstruct the free discharge of fluids of any kind. Soft dry lint is perhaps equal to any or all others. In the chirurgical writers are to be found a great many formulæ, but whoever places confidence in them, for any supposed merit of their own, will find himself much disappointed.

I cannot quit this subject, without making a short remark on the bandages most frequently advised, and used in wounds of the head.

In all the writers on the subject of fasciæ, are to be found description and delineations of those which are said to be most proper for the head. On paper they are
 neat

heat and elegant, in the application they require a small degree of practice and dexterity, and when applied nicely may impose on the ignorant, and on those who have not seen much of or reflected much on their inconvenience. They press, heat, and painfully confine the head, even when applied in the best and most ingenious manner; and when put on awkwardly or negligently are still more troublesome, and less serviceable. All that can ever possibly be wanted in these cases from bandage must be, merely to keep the dressings in their place without any degree of confinement or pressure; and this purpose will always be better accomplished by a loose cotton or yarn night-cap, than by the nicest and most elaborate bandage that ever was invented.*

C A S E

* On this subject I was very glad to find so very good a judge as Oribasius, of the same opinion.

“ Hæc autem omnia non fasciis continentur, propter
 “ pondus, sed velamento, ut cohibeantur, neque cerebri
 “ membrana gravatur; ac velamenti media pars, quæ
 “ terebrato respondet, forfice exciditur, ut apertum fiat,
 “ atque in illud spatium lana mollis, in extremis con-
 “ stricta, duplex inditur, &c.

“ Plerique

C A S E XXIX.

A Girl about fifteen years old, crossing Smithfield on a market-day, was tossed by an ox, and fell with her head on the flat stones within the posts. As her dress was mean, and nobody knew any thing of her, she was brought senseless into the hospital. She had a large bruise on the right side of her head, through which I plainly felt a fracture with depression. The scalp being removed from that part, the fracture was found to be large, and the depression considerable; it traversed the os parietale from before backward, in its middle part between the sagittal and temporal futures, and the depression was of the upper part of the bone. I applied a trephine on the inferior and undepressed part, and by means of

“ Plerique omnes non alia vinctura terebratos deli-
 “ gant; sed sola redimiculi circumductione contenti sint.
 “ Quinetiam ipsa quoque ulcera extra terebrationem,
 “ quoad fieri potest, conari debemus sine fasciis curare;
 “ non modo quia gravantur compressis iis quæ sub vin-
 “ culis imposita ipsis fuerant, verum etiam quia plus
 “ quam par est calefaciunt. Etenim quod in aliis par-
 “ tibus vinctura, id in capite positio præstabit, ideo
 “ deligare supervacaneum erit.”

ORIBASIUS de fract. ex Heliodoro.

of an elevator raised the whole to a perfect equality. Her head was dressed lightly, and sixteen ounces of blood were taken from her. She passed the following night very unquietly, and the next morning was still senseless. She was again freely bled, and a purge was given, which soon operated. On the third day her pulse admitting, and her circumstances requiring it, she was bled again. On the fourth day she became sensible, and on the fifth was surprisingly well. She remained so until the ninth, on the evening of which she complained of head-ach, sickness and giddiness. She was again let blood, and put under the direction of the physician, who ordered some medicines for her. From the ninth to the thirteenth day she remained much the same, that is to say feverish, and complaining of heat, thirst, head-ach, and watching. On the fourteenth she had a severe rigor, and the sore on the scalp as well as the denuded dura mater wore a very bad aspect. From this time she became daily worse and worse, in every respect; and on the twentieth day from that of the accident she died, having been terribly shaken by spasms for several hours.

All the internal surface of the os parietale above the fracture was detached from the dura mater, and covered with matter, which could not obtain free discharge at the perforation, the membrane being inflamed and thrust up tight against it.

I will not pretend to assert, that repeated perforation of the upper part of the bone would have preserved her; but I must say, as the case turned out, it would have been her best, if not her only chance; and that, if I had known at that time as much of these cases as I think I have since learned, I should certainly have taken away the greatest part, if not the whole, of what had been depressed.

CASE

C A S E XXX.

A Gentleman's servant riding carelessly and hastily thro' London, was thrown from his horse, and struck his forehead against a sharp stone. There was a considerable wound on the scalp, and a fracture, with depression of the os frontale. The man was perfectly deprived of sense, the bone was considerably depressed, and a large quantity of blood issued from underneath the depressed part. A trephine was applied on the undepressed part, and the elevation accomplished; he was let blood freely, and dressed lightly. On the second and third days he was let blood again. On the fourth he recovered his senses, and from that day to the ninth seemed to go on well. On the ninth in the evening he complained of pain and lassitude, and was ill that night and all the next day. On the eleventh he was worse, and (to use his own words) said, his brains were bound round with a fillet like a collar of brawn. His pulse as hard, frequent, and jarring, his skin hot, and he got no sleep at all. As the man was evidently

dently and hastily getting into a hazardous state, I was determined to try what a free removal of bone would do ; and with a large trephine took away almost the whole of what had been depressed. The dura mater was not purulent, but dull in colour, and smeared over with what Morgagni justly says, is *gelatinis instar*.

He was again and again let blood, as his pulse would bear, and the physician ordered proper medicines for him. For four days from this time he continued much the same, but after that every thing changed for the better ; he took the cortex freely, and in about three months was discharged well.

As I would not pretend to assert, that removal of more bone would have proved successful in the preceding case, so neither will I say that the recovery of this man was owing to it. I can only say, I verily believe both, and that I am sorry I did not make the same experiment in both. The cases were materially similar ; and the analogical is the only method we have of reasoning on subjects like this, wherein we cannot have demonstration.

C A S E XXXI.

A B O Y about fourteen years old, following a led horse, was desired by the servant, in whose hand the horse was, to strike him; the boy did so, and received a blow from one of the horse's heels, which brought him to the ground senseless. He had on the upper and middle part of his forehead a large wound, which disclosed a considerable fracture, with depression.

The fracture ran nearly in a transverse direction across the bone, and the depression was of the upper part. A trephine was applied, an elevator introduced, and the depressed part of the bone with some difficulty made to lie even. The head was dressed lightly, and the boy was let blood largely. He continued senseless all that night, was let blood twice the next day, and had a purge, and a glyster. On the fourth day he shewed some signs of sense, and in two more, being again let blood and kept very low, was quite sensible. From this day until the fourteenth, every circumstance was promising, but on that

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day

day he again became ill ; his pulse from this time was hard and quick, and, in short, he had for three or four days all the symptoms of mischief under the cranium. On the nineteenth I made a large perforation in that part of the bone which had been depressed and elevated, and gave discharge to a very large quantity of offensive matter. On the twenty-second he became delirious and convulsed, and on the twenty-third died.

I removed all the upper part of the cranium, and found the dura mater altered in colour, and separated from the whole frontal bone, from the fracture quite up to the sagittal future; and under the said membrane, matter to the quantity of about half an ounce.

C A S E XXXII.

THE following case was sent to me by a very ingenious practitioner at some distance from London, and may, among others of like sort, serve to prove, that it is not the formation of matter between the skull and dura mater, but the confinement of it there, which is the cause of the bad symptoms, and of the hazard.

A boy fell from a cart loaded high with hay, and pitched perpendicularly on his head. The blow stunned him for a few minutes, but he soon got up again, said he was not hurt, and walked home with the cart.

As he made no complaint at home, his master took no farther notice of his fall, and the boy followed his daily labour in the farm-yard.

At the end of a fortnight he came to my friend, and desired him to look at the swelling on the upper part of the right side of his head. The tumor appeared to be full of matter, and the surgeon divided the scalp, and let out a considerable quantity. He

passed his finger in, in order to examine whether the cranium was bare or not, and was not a little astonished to find it not only bare but considerably broken. He removed the tumid portion of the scalp; and having so done, found the distinct pieces of bone so loose as to be taken away without any resistance, and so large as together to make nearly a third part of the parietal bone. The dura mater under them was clean, and well incarned.

The boy had no one bad symptom from first to last, came to the surgeon's house every day to be dressed, and was also in the farm-yard daily.

SECT.

S E C T. VI.

Extravasation and commotion.

GREAT and hazardous as the evils are which proceed from fractures of the skull, they do not exceed those which are caused either by the extravasation of fluids within its cavity, or by the concussion or derangement of the substance of the brain; whether we regard the difficulty under which a practitioner labours in forming a judgment of the true nature of the case, or the uncertainty, or the frequent fatality of the event.

The shock which the head sometimes receives by falls from on high, or by strokes from ponderous bodies, does not infrequently cause a breach in some of the vessels, either of the brain or its meninges; and thereby occasions extravasation of the fluid, which should circulate through them. This extravasation may be the only complaint produced by the accident; or it may be joined with, or added to, a fracture of the skull. But this is not all, for it may be produced not only when the cranium is

unhurt by the blow, but even when no violence of any kind has been offered to or received by the head.

Vertigo, vomiting, stupidity, hæmorrhage, loss of sense and motion, either partial or total, are the symptoms of this kind of mischief; sometimes one, or more, sometimes all, in the same subject. These symptoms, which are all easily accountable for from extravasation of fluid and unnatural pressure made on the brain and nerves, are as I have already at large remarked, frequently mistaken as indications of a disease which, considered abstractedly, can never cause them; I mean a simple undepressed fracture of the cranium: it may be accompanied by them, but cannot cause them.

When a fluid is extravasated in any considerable quantity within the cavity of the cranium, if any bad symptoms are produced by it at all, they are, and must be, such as indicate pressure made on the brain, and origin of the nerves; occasioning thereby either disturbance or abolition of the offices of sense and motion; and this in different degree, according to the quantity, kind, and situation of the pressing fluid; and to these
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are sometimes added hæmorrhage from the nose or ears. Thus far, I think, we may pronounce positively; but to our very frequent mortification we find, these are the only circumstances which in such cases we can depend upon, every thing else which relates or belongs to them, being involved in a most perplexing obscurity. We not only have no certain infallible rule whereby to distinguish what the pressing fluid is or where it is situated, but we are in many instances absolutely incapable of knowing whether the symptoms be occasioned by any fluid at all; for a fragment of bone, broken off from the internal table of the cranium, and making an equal degree of pressure, will produce exactly the same complaints.

Sometimes indeed the case is otherwise; and, from concomitant appearances, the true nature of the disease may with some degree of certainty be known; but this does not happen very often.

Many of our ancestors, when no fracture was discoverable in the cranium of a person labouring under such symptoms as have been mentioned, in consequence of violence offered to the head, contented

themselves with calling the case a concussion ; and although they had no very precise idea annexed to the term, yet they seldom went farther for a solution : like teeth and worms in infants, or like nerves in women, it satisfied ignorant inquirers. The cranium was not broken, the mischief was out of sight, most probably out of reach, and they had not often the curiosity or the anatomical judgment to examine after death into the real state of the case.

That a concussion or commotion of the substance of the brain is a circumstance which frequently happens, is a truth beyond all doubt ; and that it is often the cause of death, is as true ; but that many of the cases which, the skull being found not broken, have passed for concussions, have been really produced by very different causes, has often been incontestably proved by the examination of such persons heads after death ; where such extravasations of blood or lymph or both have been found, as would fairly and rationally account, both for the symptoms, and for the event.

A concussion and an extravasation are very distinct causes of mischief, though not always very distinguishable.

M. Le Dran, and others of the modern French writers, have made a very sensible and just distinction between that kind and degree of loss of sense which arises from a mere commotion of the brain, and that which is caused by a mere extravasation, in those instances in which the time of the attack or appearance of such symptoms are different or distinct. The loss of sense, which immediately follows the violence, say they, is most probably owing to a commotion; but that which comes on after an interval of time has past, is most probably caused by extravasation.

This distinction is certainly just and good, as far as it will go. That degree of abolition or diminution of sense, which immediately attends or follows the blow or fall, and goes off again without the assistance of art, is in all probability occasioned by the sudden shake or temporary derangement of the contents of the head; and the same kind of symptoms recurring again some time after they had ceased, or not coming on until some time has passed from the receipt

ceipt of the violence, do most probably proceed from the breach of a vessel within or upon the brain. But unluckily we have it not very often in our power to make this exact distinction. An extravasation is often made so immediately, and so largely, at the instant of the accident, that all sense and motion are instantaneously lost, and never again return. And it also sometimes happens, that although an extravasation may possibly not have been made at the moment of the accident, and the first complaints may have been owing to commotion merely, yet a quantity of fluid having been shed from its proper vessels very soon after the accident, and producing its proper symptoms, before those caused by the commotion have had time to go off, the similarity of the effects of each of these different causes is such, as to deprive us of all power of distinguishing between the one and the other, or of determining with any tolerable precision to which of them such symptoms as remain are really owing.

When an extravasation of any kind is made, either upon or within the brain, if it be in such quantity, or so situated as to disorder the œconomy of the animal, it always

ways produces such disorder, by making an unnatural pressure on the parts where it lies. The nature and degree of the symptoms hereby produced are various and different in different persons, and under different circumstances, according to the kind, quantity, and situation of the pressing fluid. Sometimes it is mere fluid blood, sometimes blood in a state of coagulation, sometimes it is a clear lymph, and at others blood and water are found mixed together; each of these is found either simple or mixed in different situations, that is, between the skull and dura mater, between the dura and pia mater, or in the natural cavities of the brain called its ventricles, and sometimes, in cases of great violence, they are found at the same time in all these different parts. Sometimes a considerable quantity is shed instantly, at the time of the accident; and sometimes the breach by which the effusion is made is so circumstanced, both as to nature and situation, that it is at first very small, and increases by faster or slower degrees. In the former, the symptoms are generally immediate and urgent, and the extravasation is of the bloody kind; in the latter, they are frequently slight at first, appear after some little interval of time,

increase

increase gradually till they become urgent or fatal, and are in such case generally occasioned by extravasated lymph. So that although the immediate appearance of bad symptoms does most certainly imply mischief of some kind or other, yet, on the other hand, no man ought to suppose his patient free from hazard, either because such symptoms do not shew themselves at first, or because they appear to be but slight: they which come on late, or appearing slight at first increase gradually, being full as much to be dreaded as to consequence as the more immediately alarming ones; with this material difference between them, that the one *may* be the consequence of a mere concussion of the brain, and may by means of quietude and evacuation go quite off; whereas, the other being most frequently owing to an extravasation of lymph, (tho' sometimes of blood also) within the substance of the brain, are very seldom removed by art.

Extravasations of any kind, and wherever situated within the cranium, are very hazardous, and much more frequently end fatally than happily; but considered as relative to the art of surgery, that which consists

sists of merely fluid blood situated between the cranium and dura mater is certainly the best, as it is the nearest to the surface, and admits the greatest probability of being relieved by perforation of the skull ; grumous or coagulated blood, although in the same situation, by being most frequently adhering to the membrane, is not so readily discharged as the preceding, and therefore more likely to prove destructive : and all those which are either under the meninges, or within the cavities or substance of the brain, as they are very seldom within our exact knowledge, so they are also generally beyond the reach of our art.

The method of treating people under these unhappy circumstances is somewhat different, according to the supposed or most probable nature of the complaint, and according to the symptoms and appearances which it produces or which accompany it. When the symptoms which imply a pressure made on the brain or nerves have been occasioned merely by a shake or concussion, and neither blow nor other external violence has been offered to or received by the head, we have no rule whereby to form any other than a general opinion ; no mark which
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can point out to us, either the precise nature of the disease, or its particular situation ; consequently we have no direction from what part of the head to remove the scalp, or where to apply a perforating instrument, and therefore no authority for perforating at all. In this case, the only chance of relief is from phlebotomy and an open belly ; by which we may hope so to lessen the quantity of the circulating fluids as to assist nature in the dissipation or absorption of what has been extravasated. This is an effect which, although not highly improbable in itself, yet is not to be expected from a slight or trifling application of the means proposed. The use of them must be proportioned to the hazard of the case. Blood must be drawn off freely and repeatedly, and from different veins, the belly must be kept constantly open, the body quiet, and the strictest regularity of general regimen must be rigidly observed. By these means, very alarming symptoms have now and then been removed, and people in seemingly very hazardous circumstances have been recovered. Instances of these successes are not indeed so frequent as we could wish, but they have been sufficiently so to warrant the attempt, especially in cases where there are
no

no indications to authorize the use of any other. But when the symptoms of extravasation are the consequence of such external violence as leaves a mark where it was inflicted, and when the scalp is so bruised or wounded as to shew the place where, we then have some degree of assistance, both in forming a judgment of the most probable nature of the complaint, and in using the means most likely to prove successful in its relief. For if the effusion has been the consequence of the stroke which the head has received, and such effusion is made immediately under the part so stricken, the perforation of the cranium in this place may give discharge to the extravasated fluid; and the wound or bruise in the scalp shews us the point from whence we ought to remove a portion of it, in order to perforate the cranium. This I say is sometimes the case, and the consequence is sometimes so fortunate that we save a perishing patient. But, although it does now and then happen that we are so lucky, yet such success is by no means certain or to be depended upon. Every thing relative to this kind of disorder is fallible and uncertain; and though the extravasation is sometimes found immediately under the external

mark, yet it often happens that it is not, and that the effusion is made in a part distant from that mark, and to which we have nothing to lead us. Upon the whole, although a bruise or wound of the scalp does not in these cases necessarily or certainly point out the seat of an extravasation, yet when bad symptoms urge and evacuation has been fully and unsuccessfully tried, such mark may be deemed a sufficient though not unerring authority for making farther enquiry, by removing the scalp and perforating the cranium: for this is a kind of case in which we are not to expect certainty, and in which we must be content with such information as we can obtain. The opportunities which we have of being serviceable are but few; we should therefore suffer none to escape, but embrace even possibility. The general advice given by Fabritius ab Aquapendente* is applicable to no part of surgery more than

* “ In vulneribus quæ natura sua admodum periculosa sunt, pessimum est expectare prava symptomata; & tunc demum providere, cum forsitan occasio præterit, nec amplius providere licet.”

FAB. ab AQUAPENDENTE.

than to this; in which the loss of a very short space of time is absolutely irretrievable.

If the extravasation be of blood, and that blood be in a fluid state, small in quantity, and lying between the skull and dura mater, immediately under or near to the place perforated, it may happily be all discharged by such perforation, and the patient's life may thereby be saved; of which many instances are producible. But if the event does not prove so fortunate, if the extravasation be so large or so situated that the operation proves insufficient, yet the symptoms having been urgent, general evacuation having been used ineffectually, and a wound or bruise of the scalp having pointed out the part which most probably received the blow; although the removal of that part of the scalp should not detect any injury done to the bone, yet the symptoms still subsisting, I cannot help thinking, that perforation of the cranium is in these circumstances so fully warranted, that the omission of it may truly be called a neglect of having done that which might have proved serviceable, and, *rebus sic stantibus*, can do no harm. It is very true, that no man can beforehand tell whether such operation will prove beneficial or not,

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because

because he cannot know the precise nature, degree, or situation of the mischief; but this uncertainty, properly considered, is so far from being a dissuasive from the attempt, that it is really a strong incitement to make it; it being full as impossible to know that the extravasated fluid does *not* lie between the skull and dura mater, and that under the part stricken, as that it *does*; and if the latter should be the case, and the operation be not performed, one, and most probably the only means of relief, will have been omitted.

Morgagni, in his book de Causis et Sedibus, &c. has treated this subject expressly, and has enumerated all the objections which may be made to the perforation of the cranium, in the case of effusion of fluid within * it, but among others he has mentioned a
popu-

* “ Nam ut signa sint, ex quibus liceat suspicari sanguinem intra calvariam esse effusum, quis scire pro certo possit, an revera; et si hoc etiam sciret, in quam partem effusus sit, & quod consequitur, ubi os sit perterebrandum, &c.

“ Nam præter unum, qui majorem fortasse exterius dolorem moveat, alia esse possunt loca, sub quibus majus revera lateat internum vitium.

“ In

popular one, which prevails much among his countrymen, viz. the fear of having been thought to have destroyed those, whom in the nature of things they could not save, “ne sic occisi, qui servari non potuerant, viderentur.” With all possible deference to so able a man, I must say, that this does not seem to me to be by any means a good reason, or one which ought to be formed into a maxim for practitioners: it is founded on the weakness and incapacity of those who pretend to judge of what they do not understand, and therefore should never be embraced through a self-interested principle by those who know better. If such rule was
uni-

“In cognoscendo quam fallaces sæpe sint conjecturæ,
“vel hinc apparet, quod & si pars ipsa icta, ab ægro indicatur, imo ecchymosi & tumore se ipsam præclare
“indicet, non raro tamen casus incidunt, in quibus alia
“pars sit contusa, alia in quam effusio facta sit.

“Satis jam superque intelligis casus incidere, in quibus
“aut nulla, aut tam levia, inter initia se offerunt, effusi
“intra cranium sanguinis signa, tot autem, & tam gravia,
“post longum intervallum confestim se ingerunt, ut neque
“primo illo opportuno tempore æger ex timore periculi,
“ut terebram admittat, neque extremo sperare possent
“medici, opem se per eam allaturos, tam longo spatio & tam
“perniciosis indiciis extantibus.”

MORGAGNI de Causis & Sed. Morbor.

universally admitted, we should often be prevented from employing a critical opportunity, or using what in many cases is the unicum remedium, not only in this disease but in many others. The case of Ptolomey, cited by him from Livy, although brought as a strong corroboration of his own opinion, really can prove nothing, unless it could be made to prove that trephination was the cause of, or at least accelerated, the patient's death; which it can by no means be made to do. No man, who is at all acquainted with this subject, will ever venture to pronounce or promise success from the use of the trephine, even in the most apparently slight cases; he knows that honestly he cannot; it is enough that it has often been successful where and when every other means have failed. The true and just consideration is this; Does the operation of perforating the cranium in such case add at all to that degree of hazard which the patient is in before it is performed? or can he in many instances do well without it? If it does add to the patient's hazard, that is certainly a very good reason for laying it aside, or for using it very cautiously; but if it does not (which I verily believe,)

lieve,) and the only objection made to it is, that it frequently fails of being successful, surely it cannot be right to disuse that which has often been not only salutary but the *causa sine qua non* of preservation, merely because it is also often unsuccessful, that is, because it is not infallible.

I should be extremely sorry to say any thing which might mislead my reader, but I cannot help thinking, that dark and obscure as this part of surgery is, yet there are sometimes appearances and circumstances, which may be said positively to indicate the operation; among which I reckon the spontaneous detachment of the pericranium from the skull, in consequence of a heavy blow, attended with symptoms of stupefaction or loss of sense.

Whenever the dura mater is separated from its attachment to the inner surface of the cranium, the pericranium covering the outer part of the same bone is generally detached also. When this separation is produced by the formation of matter, in consequence of inflammation, the tumefaction of the scalp, which denotes this ef-

fect, appears some days after the violence has been received, and is always accompanied with a symptomatic fever. The effusion of a considerable quantity of extravasated blood on the surface of the dura mater, as it absolutely separates that membrane from the bone, and cuts off all communication between that part and the scalp, so it does in the same manner oblige the pericranium to quit its detachment to the skull, of which I have remarked frequent instances; and I have also most frequently observed, that the blood in such cases has been coagulated, and very adherent to the membrane. Now if this observation should be found to be most frequently true, that is, if a detachment of the dura mater from within the skull, by means of an extravasation, be found to be most frequently accompanied by a detachment of the pericranium on the outside, have we not thereby an indication both why and where we ought to perforate? The operation *may* not be successful, but desperation cannot be submitted to while there is the most extreme degree of *probability* of being serviceable.

A free discharge by means of it may produce a cure, or it may prove only a tempo-

tempo-

temporary relief, according to the different circumstances of different cases: the disappearance or even the alleviation of the most pressing symptoms is undoubtedly a favourable circumstance, but is not to be depended upon as absolutely portending a good event; either a bloody or limpid extravasation may be formed or forming between the meninges, or upon or within the brain, and may prove as certainly pernicious in future as the more external effusion would have done had it not been discharged; or the dura mater may have been so damaged by the violence of the blow as to inflame and suppurate, and thereby destroy the patient. The complaints arising from extravasation, and from suppuration, are (as I have already at large observed) very different and distinct from each other; the former may be relieved, or even totally removed, and the latter not prevented, nor indeed be capable of prevention; of this every practitioner should be aware, lest he expect and promise too much.

The nearer the extravasated fluid lies to the cranium the better; therefore that which is situated between the skull and dura mater is, *cæteris paribus*, the most favour-

able of any. If the disease lies between the dura and pia mater, mere perforation of the skull can do nothing; and therefore if the symptoms are pressing, there is no remedy but division of the outer of these membranes. The division of the dura mater is an operation which I have several times seen done by others, and have often done myself; I have seen it, and have found it now and then successful; and from those instances of success, am satisfied of the propriety and necessity of its being sometimes done: but let not the practitioner, who has not had frequent opportunity of seeing these kinds of things, presume, from the light manner in which this necessary operation has been spoken of by a few modern writers, that it is a thing of little consequence; for it most certainly is not. Wounds of the membranes of the brain, by whatever body inflicted, or in whatever manner made, have always been deemed, and (which is more to the purpose) have always been found, to have been hazardous. There is indeed some difference between a wound made by a clean lancet or knife, and one made by bone, bullet, or any thing which bruises or tears; but this relates only to the manner,

manner, the part wounded is the same in all ; and whether the dura mater be divided by a lancet, or by a fragment of bone, or any other body, it is equally divided, and the air is let in in the same manner on the pia mater, or brain, which become thereby subject to all the ills which such wound or such exposition are capable of causing.

Authors indeed do every now and then tell us strange stories, and give us strange accounts of incisions made into the meninges and brain in search of foreign bodies, of extravasated fluids, &c. but let the young practitioner read these relations with some reserve of faith, and recollect that the excellent advice given by a very able man, "*homines non admiratione afficere, sed eis utiliora docere,*" is not always attended to. Caution and fear are different things ; where any good can be done, it ought to be attempted by every practicable and justifiable means ; but where no good is reasonably to be expected, there is no authority for doing any thing. The division of the dura mater I have seen to be necessary, and I have seen it to be successful ; but all wounds of it are far from being matters of indifference. Every chance of life is to be embraced,

embraced, and a good surgeon will never hesitate to execute whatever appears feasible, or even possibly beneficial ; but at the same time he will not act without some such kind of warranty as shall prove that his patient's benefit was his one object, and will take care his prognostic shall not expose him justly to the censure of being either ignorant, unfeeling, or fool-hardy.

Upon the removal of a piece of bone by means of the trephine, if the operation has been performed over the part where the disease is situated, and the extravasation be of the fluid kind and between the cranium and dura mater, such fluid, whether it be blood, water, or both, is immediately seen, and is partly discharged by such opening ; if, on the other hand, the extravasation be of blood in a coagulated or grumous state, it is either loose, or in some degree adherent to the dura mater ; if the former of these be the case, it is either totally or partially discharged at the time of or soon after the operation, according to the quantity or extent of the mischief ; if the latter, the perforation discovers, but does not immediately discharge it. In both instances, the conduct of the surgeon, with regard to repetition

tion of the operation, must be determined by the particular circumstances of each individual case; a large extravasation must necessarily require a more free removal of bone than a small one; not only on account of freedom of discharge, but on account of larger detachment of dura mater; and a grumous or coagulated extravasation requires a still more free use of the instrument, not only because the blood in such state is discharged with difficulty, but because the whole surface of the dura mater so covered is always put under the necessity of suppurating, which suppuration has but one chance of a happy event, and that derivable from the free use of the perforator.

When the extravasation is not between the cranium and dura mater, but either between the meninges, or in the ventricles of the brain, the appearances are not only different from the preceding state of the case, but from each other.

When the extravasated fluid lies between the skull and dura mater, as soon as that extravasation is discharged, or the grumous blood has been wiped off, the dura mater appears flaccid, easily yields to or does not resist

resist the impression of a finger, and (the discharge being made) enjoys that kind of motion, that elevation and depression, which our fathers supposed it to have naturally and always, but which is only the consequence of the circulation through the brain, and the artificial removal of the piece of bone. But when the extravasation is situated between the meninges, or on the surface of the brain, the appearance is not the same. In this case there is no discharge upon removing the bone, and the dura mater, instead of being flaccid and readily obeying the motion of the blood, appears full and turgid, has little or no motion, and pressing hard against the edges of the perforation, rises into a kind of spheroidal form in the hole of the perforated bone. If the extravasation be of the limpid kind, the membrane retains its natural colour; but if it be either purely fluid blood, or blood coagulated, and the subject young, the colour of the membrane is so altered by what lies under it, that the nature of the case is always determinable from this circumstance.

Be the extravasated fluid what it may, it has no natural outlet; absorption was the only chance the patient had whereby to get rid

rid of it without an operation, and that we must now suppose to have failed; an artificial opening therefore must be made, by the division of the dura mater, and perhaps of the pia also. This operation, under the circumstances and appearances already mentioned, is absolutely necessary, and has been successful; it is performed to give discharge to what cannot be got rid of by any other means, and consists in a division of the membrane or membranes, made in a crucial form with the point of a lancet. The operation in itself is extremely simple and easy, but the patient is thereby put into the state of one whose meninges have been wounded, with only this difference, that the wound made for this purpose is smooth and simple, and inflicted with the least possible violence; whereas an accidental wound of the same parts may be lacerated, contused, and attended with circumstances which must aggravate the evil, and may induce worse consequences.

Of commotion or concussion of the solid parts of the brain, we have only a negative kind of proof, and therefore are still more

in the dark, than we are with regard to extravasation.

Very alarming symptoms, followed sometimes by the most fatal consequences, are found to attend great violences offered to the head; and upon the strictest examination both of the living and the dead, neither fissure, fracture, nor extravasation of any kind can be discovered. The same symptoms, and the same event, are met with when the head has received no injury at all ab externo, but has only been violently shaken; nay, when only the body or general frame has seemed to have sustained the whole violence. It is a commonly received opinion, that a concussion of the brain is always in proportion to the resistance which the cranium makes; that if the latter sustains a considerable degree of fracture, the former is but slightly injured, and that the concussion of its contents is great in proportion. This may sometimes be the case; violent and even fatal commotions of the brain happen when no injury has been done to the skull, and very large and terrible fractures are sometimes unattended with any symptoms of concussion; all this is sometimes true, but the position can by

no means be admitted as a general principle, whereon to form our judgment, or whereby to regulate our conduct, experience frequently contradicting it.

The symptoms attending a concussion are generally in proportion to the degree of violence which the brain itself has sustained, and which indeed is cognizable only by the symptoms. If the concussion be very great, all sense and power of motion are immediately abolished, and death follows soon: but between this degree and that slight confusion (or stunning, as it is called) which attends most violences done to the head, there are many stages. Sometimes a concussion produces the same kind of oppressive symptoms as an extravasation, and the patient is either almost or totally bereft of sense: at other times no such symptoms attend, but the patient gets no sleep at all, has a wild look, an eye much like to that of a person who has long watched through apprehension and anxiety, talks much and very inconsistently, has a hard labouring pulse, some small degree of fever, and sometimes an inclination to vomit; if not retained, the patient will get out of bed, and act with a kind of frantic absurdity, and appears

appears in general much hurt by a strong light. A debility of understanding, an idiot look, a failure of memory, a paralytic affection of some one part or limb, the loss of sense, spasm, resolution or rigidity of some one part or muscle, are often the consequence of it. These complaints are sometimes cured, but some of them do sometimes remain through the rest of life.

To distinguish between an extravasation and a commotion by the symptoms only is frequently a very difficult matter, sometimes an impossible one. The similarity of the effects in some cases, and the very small space of time which may intervene between the going off of the one and accession of the other, render this a very nice exercise of the judgment. The first stunning or deprivation of sense, whether total or partial, may be from either, and no man can tell from which; but when these first symptoms have been removed, or have spontaneously disappeared, if such patient is again oppressed with drowsiness, or stupidity, or total or partial loss of sense, it then becomes most probable that the first complaints were from commotion, and that the latter are from extravasation; and the greater
the

the distance of time between the two, the greater is the probability not only that an extravasation is the cause, but that the extravasation is of the limpid kind, made gradatim, and within the brain.

Whoever seriously reflects on the nature of these two causes of evil within the cranium, and considers them as liable to frequent combination in the same subject, and at the same time considers, that in many instances no degree of information can be obtained from the only person capable of giving it (the patient), will immediately be sensible, how very difficult a part a practitioner has to act in many of these cases, and how very unjust it must be to call that ignorance, which is only a just diffidence arising from the obscurity of the subject, and the impossibility of attaining materials to form a clear judgment.

When there is no reason to apprehend any other injury, and commotion seems to be the sole disease, plentiful evacuation by phlebotomy and lenient cathartics; a dark room, the most perfect quietude, and a very low regimen, are the only means in our power; and are sometimes successful.

Having in the preceding sheets frequently spoken of the trephine, I have only to add, that if such operation be attended with success, that is, if an extravasated fluid be thereby discharged, a depressed bone elevated, matter which had been formed between the skull and dura mater let out, or the inflammatory tension of the membrane prevented, in such manner as to rescue the patient from the danger he was in from such accident; in such cases, I say, that the bare dura mater readily obeys the motion of the blood thro' the brain, and is freely elevated and depressed; by degrees it loses its bright silver hue and becomes purulent and sloughy, and then casting off this slough is covered by a granulation of new flesh, of firm consistence and florid red colour; a moderate quantity of good matter is discharged daily, and the new incarnation rises gradually through the perforation, until it gets above the edges of it, when joining with that which either has sprung from the surface of the bare cranium, or which has thrown off from thence a small exfoliation, they together make a firm cicatrix. During all this time the patient is generally free from fever or pain, gets good sleep, has a natural appetite, and seems as

near

near to being in health as his circumstances can permit.

On the other hand, if the mischief be such that all means prove ineffectual, the appearances are very different. The dura mater, instead of casting off a thin slough and incarning kindly, becomes hard, tense, and foul; in a few days it generally thrusts up an ill-natured fungus, which pressing hard against the edges of the perforation, prevents the discharge from within; the bare bone becomes blackish or deeply yellow, and the edges of the sore in the scalp are painful, loose, flabby, and have no connection with the bone on which they lie; the discharge is a thin stinking gleet, and large in quantity; the patient is hot, thirsty and sleepless; the tongue is black, the pulse hard and quick; sometimes a delirium, and sometimes frequent spasms disorder and shake his whole frame; his countenance is flushed and has a yellow tint, his eyes lose all their natural brightness and seem sunk in their orbits, and his rigors, which were at first slight and few, become more frequent and more severe as his dissolution approaches. A slight degree of these symptoms is sometimes got the better of by pro-

per care and treatment ; but if they are far advanced, or run very high, we may use the words of a very excellent writer on this subject, I mean Berengarius Carpenfis : *Hic casus est de his, e quibus non evadunt aliqui, nisi mihi dei.*

C A S E

The sentiments of a very ancient writer on this matter are so very just and apposite, that I hope the reader will excuse the length of the quotation.

“ Qui sanescere possunt, vel perituri sunt, ex his con-
 “ jicere est ; plurimum quidem ex ipso vulnere, deinde &
 “ ex reliquo corpore.

“ Salubriter se habentium notæ sunt, ulcus non dolens,
 “ cerebrique membrana naturalem colorem, ac motum
 “ servans, & ulcus post suppurationem imminui. Pus al-
 “ bum, æquale, modice crassum, non maleolens. Ulcus
 “ quod initio album apparuit, post aliquod tempus rube-
 “ scere, carnem milio similem producere, squamulasque
 “ suis temporibus emittere ; sine perturbatione somnum
 “ capere ; sine febre esse, cibum appetere ; assumpta di-
 “ gerere ; æquas excretiones fieri ; glandulas, quæ primis
 “ diebus apparuerant, aut erysipelas cito dissolvi.

“ Eos, qui periclitantur, cognoscere licet tum aspectu,
 “ tum ex iis quæ vulneri cæteroque corpori accidunt, &
 “ iis quæ excernuntur. Color igitur plerumque langui-
 “ dus & permanens, periculosus, oculique concavi & ex-
 “ tantes, &c. Ulcus dolere, magis interdiu, retorridum
 “ fieri, atque omni plerumque tumore carere, vel saniem
 “ manare tenuem, ac male olentem ; orasque sectæ carnis
 “ admodum rubras & flaccidas esse, atque ubi magis re-
 “ flexæ sint, tunc abscedere cutem ab osse molestum est,
 “ membranamque vulneratam immobilem esse, exalbidam

“ vel

C A S E XXXIII.

A Young fellow about twenty-four years old was thrown by the swing of a crane at the water-side from a window two stories high, and pitched his head on a sugar hoghead. He was taken up senseless, and brought in that state to St. Bartholomew's hospital.

He was immediately let blood freely, and his head being first clean shaved was very carefully examined, but no external mark of violence was found. Next morning he was bled again, and the same operation was repeated in the evening of that day, and twice in the course of the third. On the fourth day both the temporal arteries were opened,

“ vel lividam apparere, vel nigram, vel plurimum inflam-
 “ matam aut procidentem, purgatamque, iterum sponte
 “ non ob aliqua re externa fordescere. ORIBASIUS
 “ de Signis.

“ Spem vero certam faciunt, membrana mobilis ac sui
 “ coloris, caro increescens rubicunda, facilis motus max-
 “ illæ, atque cervicis.

“ Mala signa sunt membrana immobilis, nigra vel li-
 “ vida, vel aliter coloris corrupti, dementia, acris vomitus,
 “ nervorum distensio vel resolutio.---Caro livida, maxil-
 “ larum atque cervicis rigor.” CELSUS.

opened, and bled freely. On the fifth day he died, his symptoms not having remitted in the smallest degree. The cranium was perfectly uninjured. The dura mater every where adherent, and no fluid of any kind between it and the skull. Between the dura and pia mater was a considerable quantity of fluid blood, and principally toward the lower part of the brain.

C A S E XXXIV.

A Hackney coachman was thrown from his box in Holborn, and fell on his head, as it was thought. He became immediately insensible, and was brought so to the hospital. No mark of violence was to be found on any part of his head, and therefore, although his symptoms were such as rendered an extravasation most probable, yet there was no authority for setting on the instrument on any particular part. Every thing was done for him both by the physician and myself, from which any advantage might reasonably be expected; but on the third day he expired, having never shewed any signs of sense.

All the space between the frontal bone and the dura mater was covered with grumous blood, firmly adherent to the latter.

C A S E XXXV.

A Bricklayer's labourer fell from a high scaffold, broke one arm and one thigh, and was brought to the hospital about two hours afterward in a state of stupidity. When his arm and thigh were put to rights his head was examined, but no mark of mischief discovered. He was bled freely, and stools procured on each day for four, but he continued in the same state; on the fifth a small tumor arose on the right side of his head. The scalp was removed, and the bone being found bare, it was immediately perforated. The perforation made way for a large discharge of blood, which had been contained between the dura mater and skull. On the first and second day from this operation he remained the same; blood was drawn from some part of him on each, and the discharge continued large and free through the opening made in the bone. On the third day from the application of the trephine, he became toward evening somewhat

what sensible. On the fourth, having taken a laxative medicine, he had a smart purging which lasted some hours. On the sixth he was quite calm and sensible, but being reduced to a very low state by his free and frequent evacuations, it was thought right to give him the cortex. This agreed well with him, and from this time he had no other difficulty or trouble.

C A S E XXXVI.

A Boy about ten years old, climbing up a ladder which was set too perpendicularly, fell from an height of more than twenty feet; he lay some time before he was found, and then was carried home perfectly void of sense. In about three hours after the accident I saw him. He lay quite stupid and senseless, now and then vomited, had a hard, full, labouring pulse, and an obstructed respiration. No mark of violence appeared on his head. He was bled freely, and had a stimulating glyster, which procured a free discharge. During three days he was let blood twice a day; on the fourth, a small degree of tumefaction appeared on the right side of his head near to the sagittal

tal future ; it was not very manifest, neither did it appear to contain any considerable quantity of fluid ; but the very desperate circumstances the child was in, induced me to open it, and, finding the skull bare, to perforate. The dura mater was covered with blood, which discharged freely, both at the time of the operation, and during all the next day. On the third day from the operation he was still insensible. A second perforation was made just below the first, and a third on the other side of the future. Blood was discharged freely from all three. He was dressed lightly, and his pulse being still strong, more blood was drawn from one of the jugulars. The next day he was rather better, but far from sensible. The day following that, he recovered his understanding, and could make signs for what he wanted. It was near a week more before he got his speech, but in the end he got perfectly well.

CASE

C A S E XXXVII.

A Boy between three and four years old, the son of a merchant in my neighbourhood, was at play with his brother on a bed, and fell from thence on a soft bedside carpet. He pitched on his head, and complained immediately of being sick and giddy, but having vomited, was soon after so well that no farther notice was taken of his fall. On the fourth day from this, his sickness and giddiness returned. Dr. Lee was sent for, who not regarding the fall as having any share in his complaint, gave him an emetic, and ordered him some of those medicines which are called nervous. For the space of five days from this time, he continued to be now and then sick and giddy, and was very unwilling to stir or be stirred. On the eleventh he complained that he could not see, and that evening had a sort of fit. On the thirteenth his right arm became useless. On the fifteenth he could not stand. From this evening he became stupid; on the eighteenth expired.

Between the dura and pia mater was a considerable quantity of bloody serum about the basis of the brain.

C A S E

C A S E XXXVIII.

A Woman came to my house, complaining that her husband had kicked her down stairs, and had broke her skull. On the back part of her head was a small wound, but the pericranium was not divided, nor was there any reason to suppose the bone to be hurt. For twelve days she remained without any general complaint; but on the thirteenth she began to be giddy and dim-sighted.

I took her into the hospital, where she was taken all possible care of; but she became first paralytic, and then comatose, and so died. The ventricles of the brain were full of extravasated serum, and near the origin of the medulla oblongata was a large lump of firmly coagulated blood.

C A S E XXXIX.

A Carpenter's labourer in Blackfryers fell from a scaffold of a considerable heighth, and in his way down, struck a piece of timber, which following him hit him on the head. The man fell on his breech. He was brought to the hospital senseless. The mark on his head made by the timber was scarcely visible, and did not imply any mischief underneath. He was freely let blood, and his body emptied by a glyster administered that day. The next day more blood was drawn from one jugular, and the third the same operation repeated. On the fourth he spake, and on the fifth was so sensible as to give an account of the place from whence he fell. On the sixth, seventh, eighth, ninth, tenth, and eleventh, he was free from complaint, except on the two last he was too much inclined to dose. On the twelfth he found some difficulty in pronunciation, and said, that it was with great difficulty that he could keep himself awake. As his pulse would very well bear it, more blood was drawn away by opening

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ing the temporal artery, and a blister was applied to his neck. On the fifteenth he could hardly speak at all, and was never awake unless disturbed for that purpose. On the eighteenth he lost the use of his left side, and on the twentieth died.

About the lower part of the brain was found a small quantity of bloody serum, and all the ventricles were filled with a clear lymph.

C A S E XL.

A Boy about fifteen was thrown over the head of a horse, who fell down with him in Smithfield. There was on the side of his head a large wound with a bare parietal bone ; and although there was no appearance of fracture, yet the violence having been great, and the boy being perfectly stupid, I immediately perforated the bare bone, suspecting an extravasation on the dura mater. That membrane was perfectly fair and adherent, nor was there any appearance of extravasation either upon or under it. The next day he was still insensible. I examined the membrane again very carefully,

carefully, in order to see whether there was any authority for dividing it, but could find none. Blood was drawn from different parts in large quantity, but to no purpose; he lived three days as it were in a deep sleep, and then died. There was no injury done to the skull; no extravasation of either blood or serum, either upon or between the membranes, nor any unnatural appearances in the cavities of the brain. But upon the plexus choroides was a lump of coagulated blood, near as big as half a small chesnut.

In the course of these papers, I have more than once said, that although the symptoms arising from pressure made on the brain and nerves, or on the meninges, were uniform and clear and perfectly distinct from those caused by inflammation, yet that they very seldom indicate what kind of body such pressure was made by; whether blood, water, or bone; and consequently, that although the disorders proceeding from pressure were perfectly distinguishable from those caused by inflammation, yet they were not at all or very seldom so with regard to each other. Some of the immediately preceding

ceding cases are proofs, with regard to blood and lymph, and what follow will I think in some degree prove that the symptoms are the same, when they are caused by bone, or by blood and bone together.

C A S E XLI.

A Child about nine years old received a blow from a cricket-bat on the upper part of his forehead, which brought him to the ground, and deprived him of sense. I found him with a considerable tumor on his forehead, and considering the state he was in, would have removed immediately a part of the scalp ; but a dabbler in surgery, who was a relation, undertook to cure him by an application. On the third day I was sent for again, and found him nearly in the same state as I left him. I divided the scalp, and found a fracture with depression. By means of the trephine and elevator the depressed part was raised, and the dura mater being found in a very good state, and no apparent extravasation in the case, nothing more was done at that time. Proper medicines were ordered to procure stools. The next day his symptoms were the same, except that his pulse

pulse was less labouring, and he had not the apoplectic stertor, which he had till then. I examined the bone, which lay perfectly smooth, nor was the dura mater at all elevated into the perforation. Blood was freely drawn from the temporal arteries, and a stimulating glyster administered. On the fifth day no alteration. I applied a trephine in the middle of that part of the bone which had been depressed and elevated. The dura mater was thinly covered with grumous blood, which being gently wiped away more of the same appeared; for two or three days this discharge continued in small quantity; the boy gradually recovered his senses, and in due time got well.

CASE

C A S E XLII.

A Young woman was thrown out from a country waggon, upon a broad flat pavement, and said to have pitched upon her head. She was instantly deprived of sense, and brought to the hospital in that state. Her head was immediately shaved, and examined, but found to be so absolutely free from all mark of violence, that I was in doubt of the truth of the account given of her. She was freely let blood, and some medicines directed to be got down, in order to empty her. The next day she was in the same state. More blood was drawn off, and her cathartic repeated. The third day, she being exactly the same, both the temporal arteries were opened. On the fourth, there being no alteration, I determined to apply a trephine on that part of her head, on which she was said to have fallen, and which when pressed hard, seemed to produce such motion in her as if it gave some pain.

In a case of less necessity this would hardly have been an authority, but here something was to be attempted. I removed a large piece of scalp, and found the pericranium, though not detached absolutely, yet not naturally or firmly adherent. I

applied the trephine, and when I had worked a few seconds, I took out the instrument to clean it, but was much surprised to find in it a piece of the upper table of the skull. I put in my finger to feel what was underneath, and found that it touched the remaining table, which receded from the finger, and returned again upon removing it; and when I pressed the said loose piece hard, the girl's whole frame was spasmodically agitated. What was to be done? it appeared to me, that if all her symptoms were not caused by the pressure of the loose piece, yet they were certainly aggravated by it, that it must therefore be taken away at all events, and that it was much too large to be extracted at the present opening; beside which, as it ran upward toward the sinus, I should not have chosen to have run the risk of an hæmorrhage from thence while the sinus was covered with bone. I perforated all round the present opening with a small trephine, in such manner, that each perforation so bordered on the other as that the whole should make one opening.

For near one half of the circle the outer table only came away in the instrument, leaving the inner loose and covered with blood,

blood, but in all the lower part, the trephine went through both tables, and left the dura mater covered with grumous blood also. When the circle was finished, the loose portion was easily taken away; its upper part made a part of the sagittal future, but no blood followed its separation. The dura mater under the whole was thinly covered with grumous blood. Next day she retained her urine, and opened her eyes. In two more she recovered her speech, and became as rational, as I suppose she ever had been; and would in all probability have done well, as far as regarded the evils produced by mere pressure; but after some days mater formed between the detached dura mater and the skull, and the symptomatic fever, usually accompanying such mischief, came on with such rapidity, that all the efforts of art were vain.

C A S E XLIII.

A Porter at work at the water-side, was knocked down by a blow from an iron hook, at the end of the tackle belonging to a crane. He was senseless for near half an hour, but after that was so well as to walk home. The next morning he lost his
fight,

sight, and by the evening his speech, and faculty of walking. In this state he was brought to the hospital. He was largely let blood, and thoroughly emptied, and I intended, if these evacuations did not materially serve him, to have examined the state of that part of the bone whereon the blow was received ; but that night he died.

Upon examining his head, a piece of the inner table of the right os parietale, of about an inch and half in length, and not quite so broad, was found detached from the outer table, having a quantity of blood both between them and on the surface of the dura mater.

These are the only instances which I have met with of fracture of the internal table alone ; though I make no doubt, that some of those who have been said and thought to have been destroyed by concussion, have sunk under this kind of mischief.

F I N I S.

